OLYMPUS
OM 4
REPAIR MANUAL

Complimentary Copy
Not for Resale

OLYMPUS OPTICAL CO., LTD. TOKYO, JAPAN

http://olympus.dementia.org/Hardware

CONTENTS

OM 4 REPAIR MANUAL

Section A.....General Outlines

B.....Inspection Standards

C.....Disassembling Procedures

D.....Reassembling and Adjusting Procedures

E.....Diagnostic Procedures

H.....List of Tools & Jigs

I.....Description of Mechanism

Z.....Other information and compatability with OM Systems Accessories

NOTE: Some of the information in this manual is specific to either early or later production cameras and may not apply to the model you are working on. Wiring and circuit diagrams are supplied for both early (ROM 1) and later (ROM 4) models.

A. GENERAL OUTLINE

1. Outline of Product

Model name	:	OLYMPUS OM-SYSTEM OM-4
House code	:	MDY-2

2. Main Specifications

Type	:	TTL auto-exposure SLR camera
Film format	:	24 mm x 36 mm
Lens mount	:	Olympus OM mount
Shutter	:	Electronically controlled focal plane shutter with horizontally travelling cloth curtain; 1 to 1/2000 sec., shutter speed; 1/60 sec., mechanical shutter speed.
Synchronization	:	X contact (synchronization at speed of 1/60 sec. or slower); hot shoe with contacts for T-series flash; 5-pin connector for T-series flash; synchro socket (JIS type)
Light measuring method	:	Center-weighted average light measurement, switchable to spot measurement; measuring spot at the microprism area of the finder screen; spot metering selective in 3 modes; multi-spot measurement, highlight- and shadow-based methods Light measuring range: 0EV to 19 EV (ISO/ASA 100, 50 mm at F1.4)
Automatic exposure control by average light measurement	:	TTL direct "off-the-film" light measuring with aperture-preferred electronic shutter; exposure control range; about 1 min. ~ 1/2000 sec. (approx. –5 EV ~ 19 EV at ISO/ASA 100, 50 mm F1.4, normal temperature and humidity); ±2 EV exposure compensation
Automatic exposure control by spot measurement	:	TTL spot metering memory system (AE lock); exposure control range: about 4 min. ~ 1/2000 sec. (approx. 0 EV ~ 19 EV at ISO/ASA 100, 50 mm F1.4, normal temperature and humidity); multiple spot method, highlight method and shadow-based method selectable; ±2 EV exposure compensation.
Automatic exposure memory control	:	Exposure value memory system (60 min. limiter) Automatic exposure value obtained by TTL direct light metering stored in average light measurement mode EE lock value obtained by spot light measurement stored.
Manual exposure control	:	B, 1 sec. ~ 1/2000 sec., mechanical exposure time 1/60 sec. X contact synchronized at speeds of 1/60 sec. or slower
Film sensitivity	:	ISO/ASA 6 ~ 3200
Film advance	:	Film advancer lever with 130° angle for one long or several short strokes and pre-advance angle 30°; motor drive and winder usable
Film rewind	:	Rewind crank (motorized rewind with Motor Drive 2 possible)
Viewfinder	:	Viewfinder with dioptric correction; +1, 0 ~ –3 diopters; with dioptric correcting lock mechanism; interchangeable focusing screens; microprism/split image-matter standardized (1 ~ 13 types) Finder view-field: 97% of actual picture field Magnification: 0.84X at infinity with –015 diop. and 50 mm lens

Viewfinder information	:	LCD multi-mode display; built-in illuminator (10 sec. limiter) Indication limiter 120 sec. Suitable shutter speeds 1 ~ 1/2000 sec. indicated by a bar in 1/3 EV steps Luminance of photographic body indicated by a dot and calculated value indicated by a bar in spot light measurement mode Indication marks: SPOT, HILIGHT and SHADOW Mark indication on red LED upon completing flash charging Suitable strobe flashing indicated by flickering of red LED in flash mode Over and under exposure indicated by OVER and UNDER marks Definite point matching and set shutter speed indicated in manual exposure mode MEMO mark indicated upon setting and MEMO mark flickers upon completion in exposure memory mode
Mirror	:	Large quick return mirror coated with multi-layer film
Self-timer	:	12 sec. delay electronic self-timer
Battery check	:	3-level display with LED and alarm sound; automatic lock with batteries exhausted
Power source	:	Two silver-oxide batteries SR44 or alkaline-manganese batteries LR44
Camera back	:	Removable hinge type with memo holder; interchangeable with Recordata Backs and 250 Film Back
Dimensions	:	136 (W) x 84 (H) x 50 mm (body only)
Weight	:	540g (body only)

EXPLANATION OF MARKS

① Indicates parts that are supplied both as a single piece and as an assembled unit. In such case, the single part is incorporated in the assembled unit indicated with the mark (①).
Exception: Parts in the mark ( ) are not supplied in single pieces.
(Parts that are supplied only in single pieces are not indicated with any mark. While parts that are supplied as an assembled unit are prefixed with "Z" or "U".)

] **Several types of parts for the same position are available, from which most suitable one is to be selected.**

✻ 3 Parts differ according to different models and types. This mark is used to indicate various combinations in a picture.

Left-handed screw. The mate screw hole is not marked particularly.

Indicates parts that should not be touched directly by bare hand because special surface treatment is applied. Wear fingerstalls or use tweezers.

★ Not supplied as a repair part.

Used exclusively for black finish models.

Indicates original parts. New, modified ones are not indicated with this mark. Both original and modified parts are supplied.

No more available parts due to design change or out of stock.

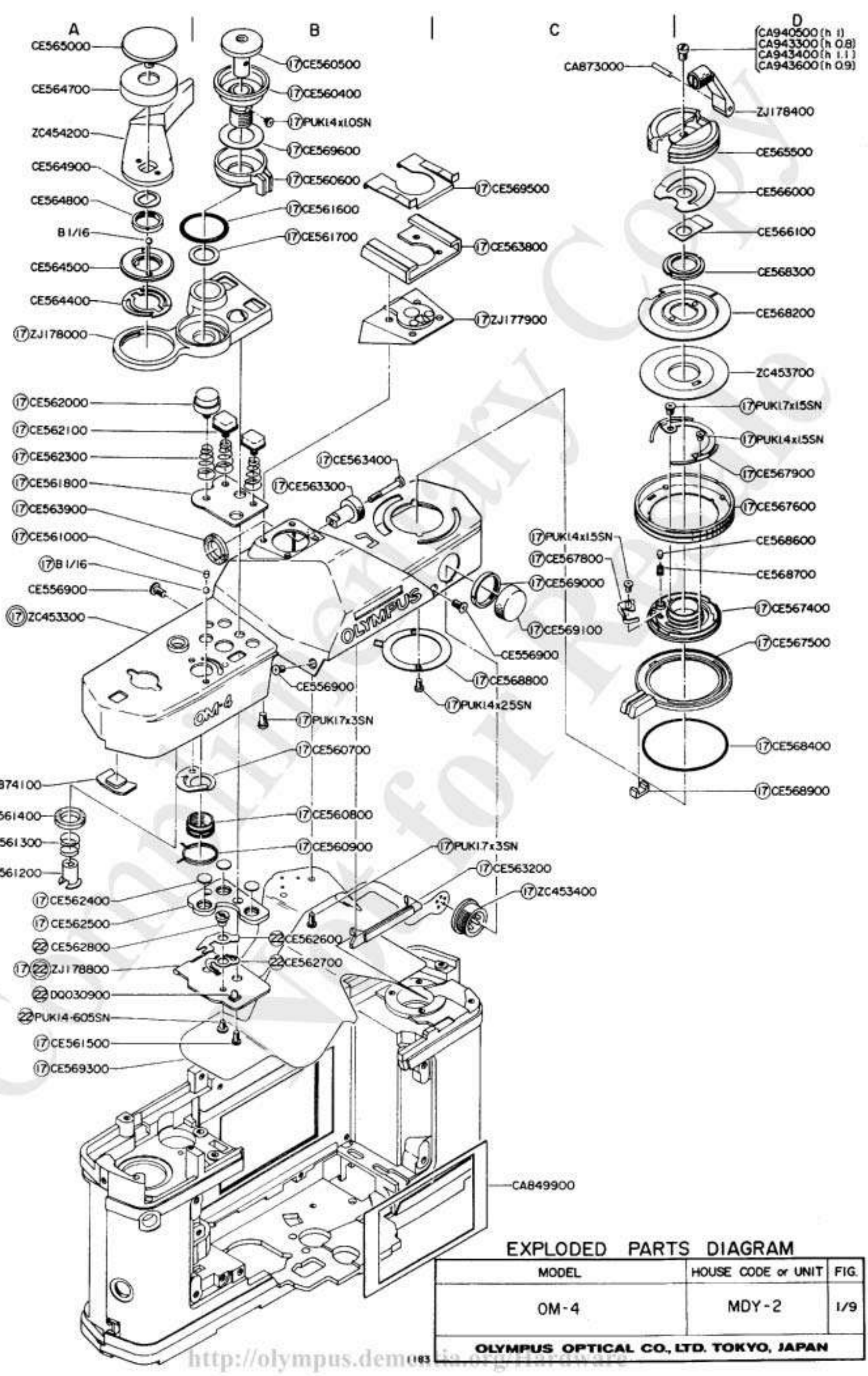
A correction mark. Parts with this mark are not available.

< 2 > Modified parts that are unable to show in the technical manual. The figure indicates reference page number.

2-A3 This notation is entered in the "Remarks" column of parts list and indicates parts position in the technical manual.

2-A3 — Parts position. The technical manual is divided into 16 equal sections. Each section can be identified by using A, B, C and D from left to right and 1, 2, 3 and 4 from top to bottom.

——— Indicates page number in which the technical manual appears. However, 1.1 (page 1 of 1) is not indicated particularly.



EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	1/9
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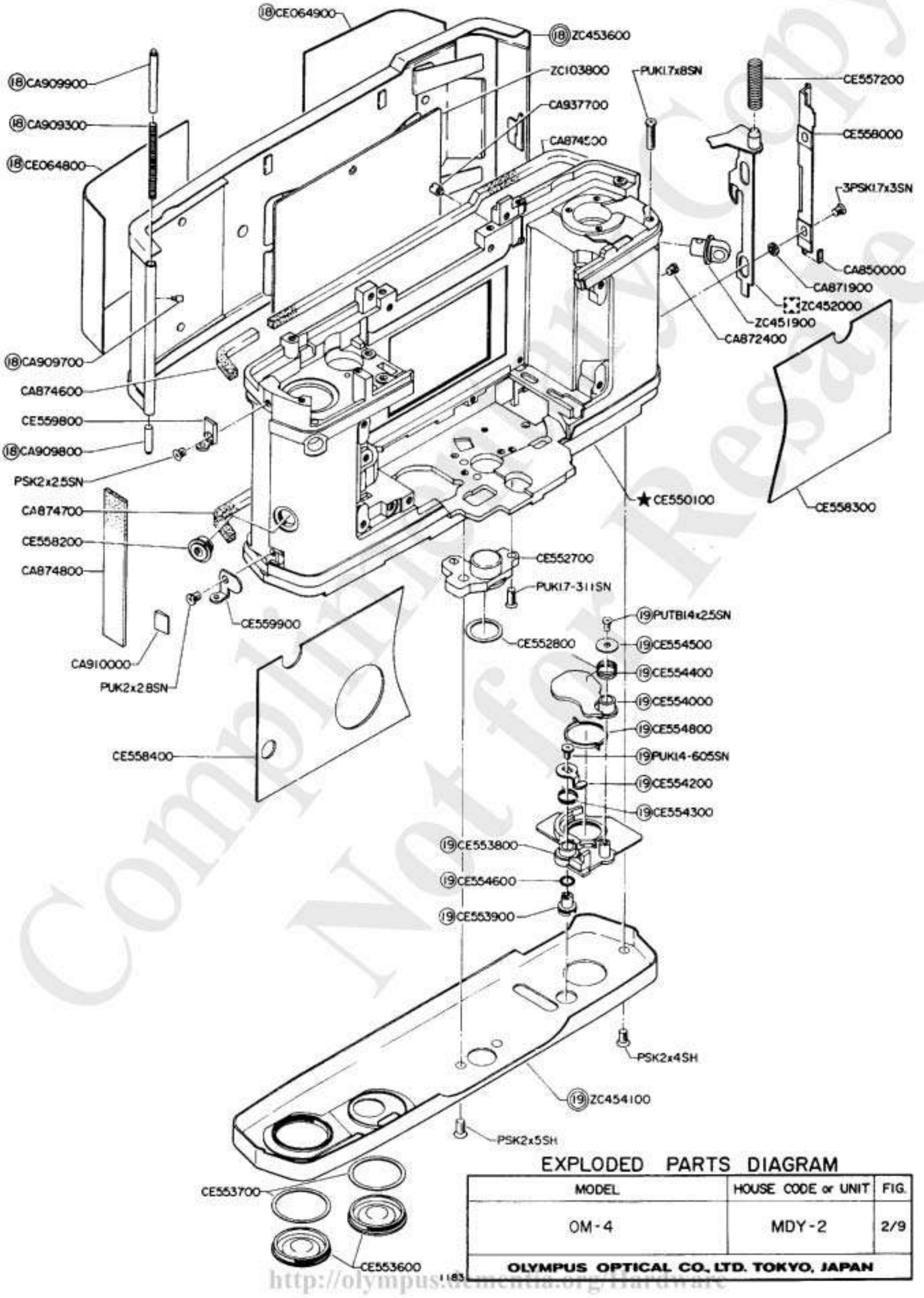
A B C D

1 2 3 4



EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	2/9
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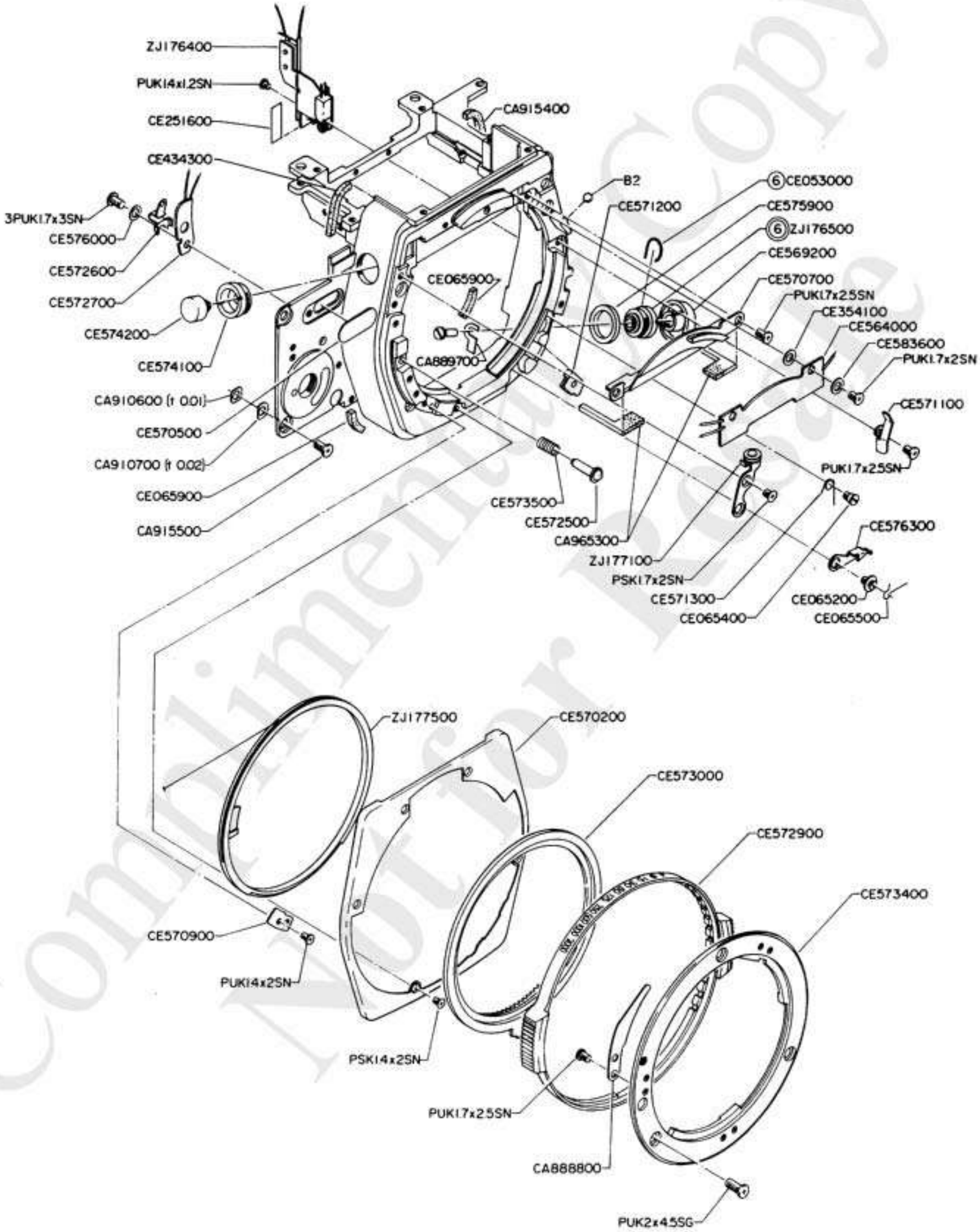
A B C D

1

2

3

4



EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	3/9
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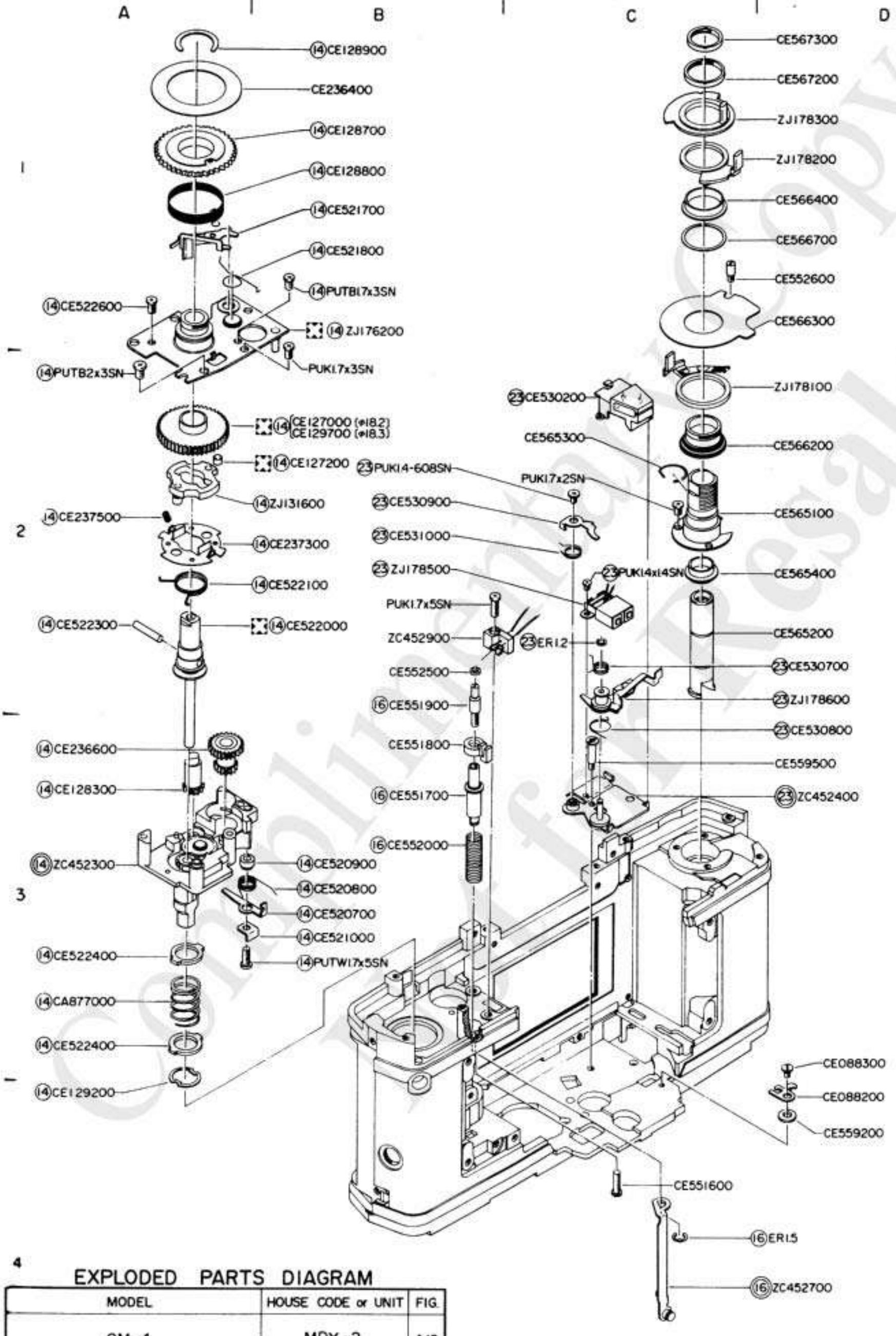

EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	4/9
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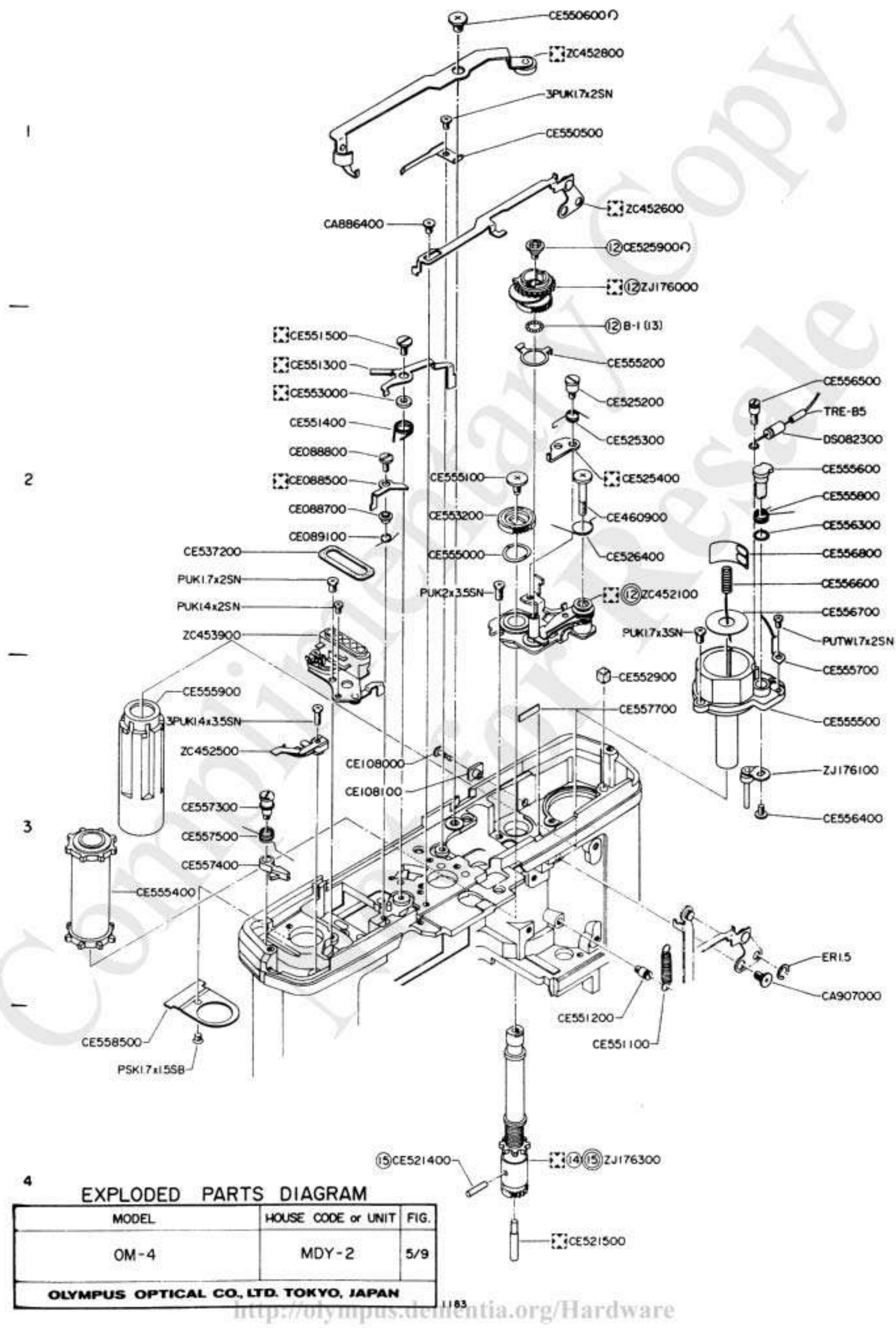

EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	5/9
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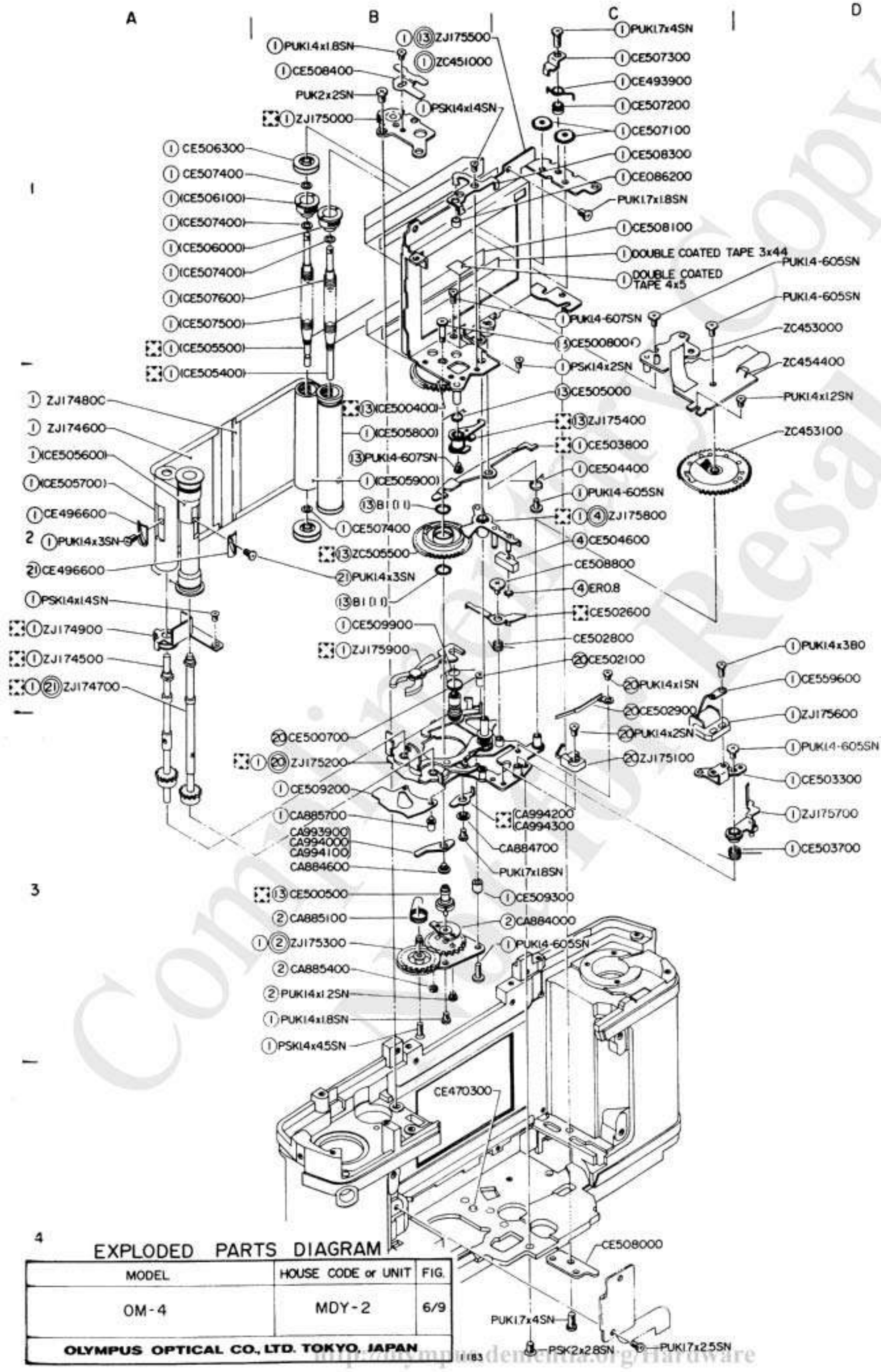

EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	6/9
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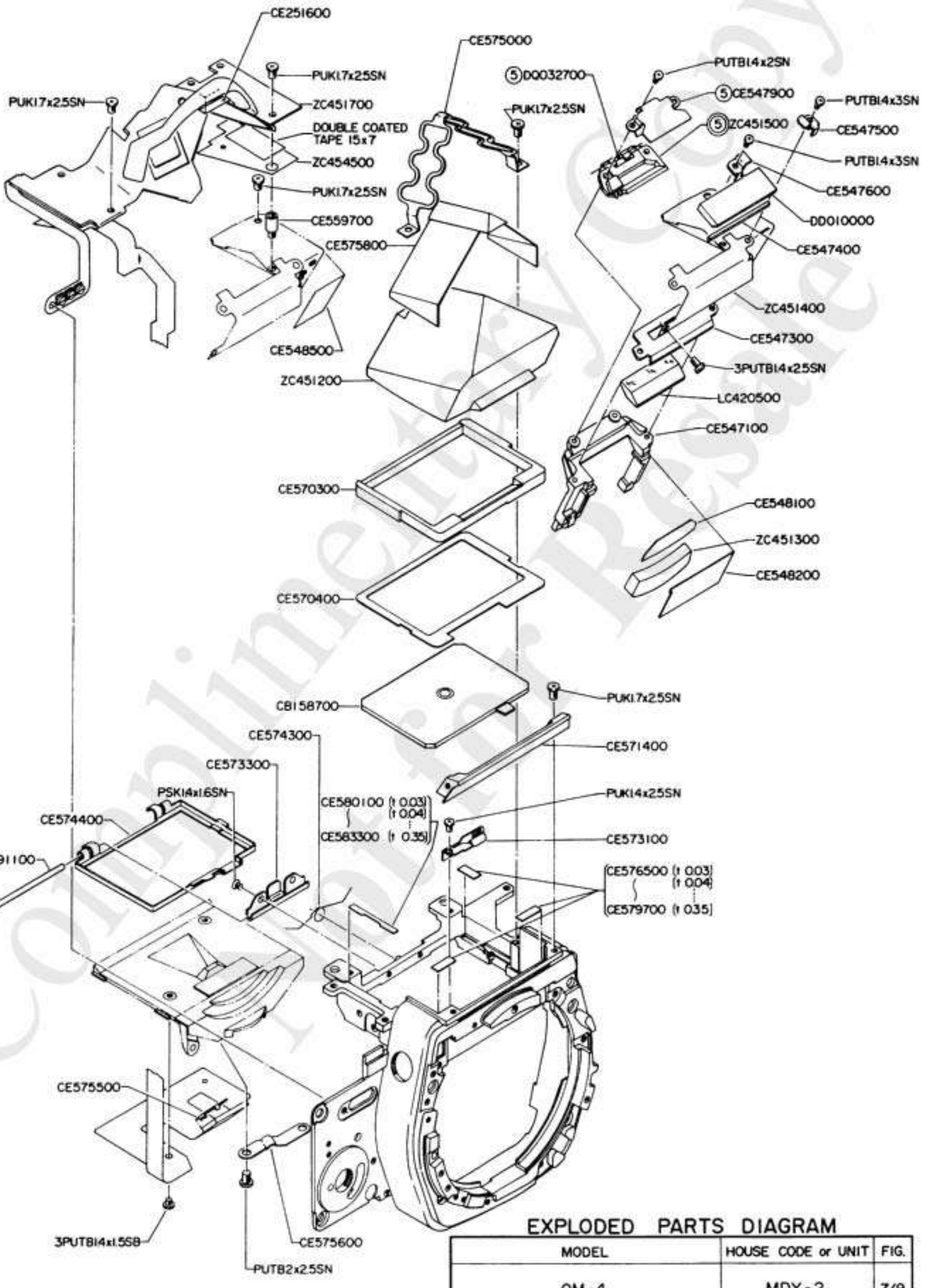

EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	7/9
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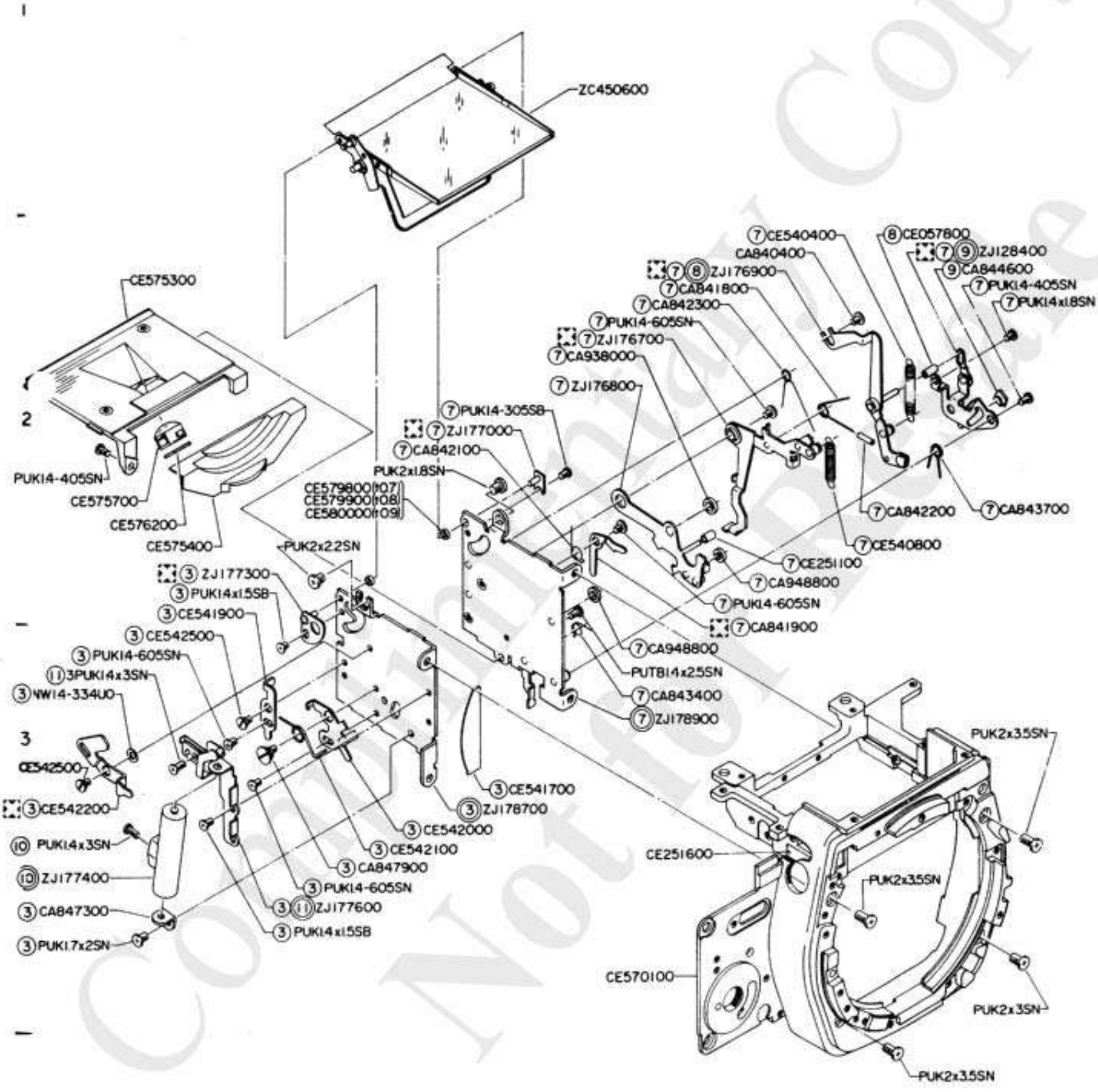

4

EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
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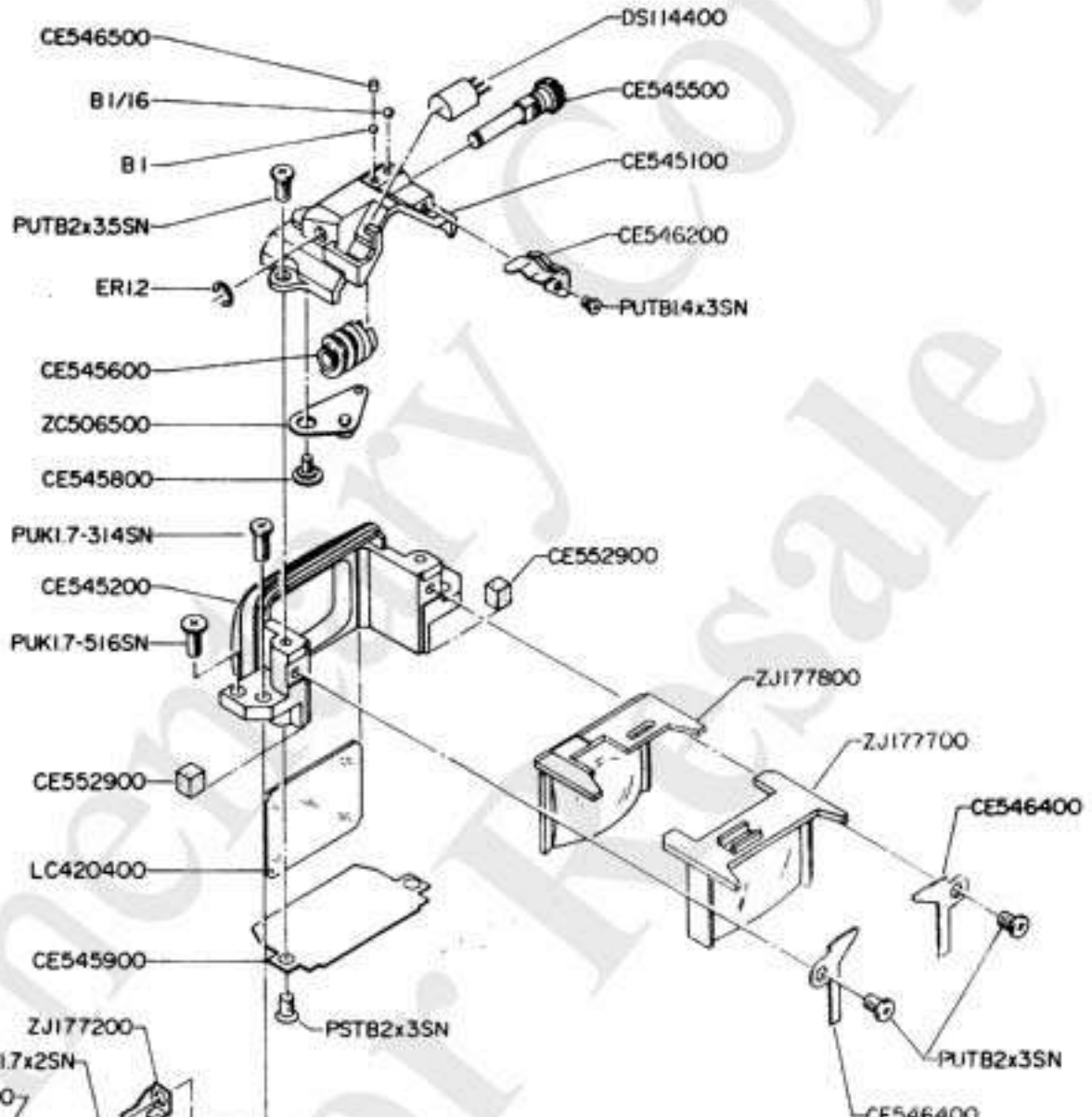
A B C D

1



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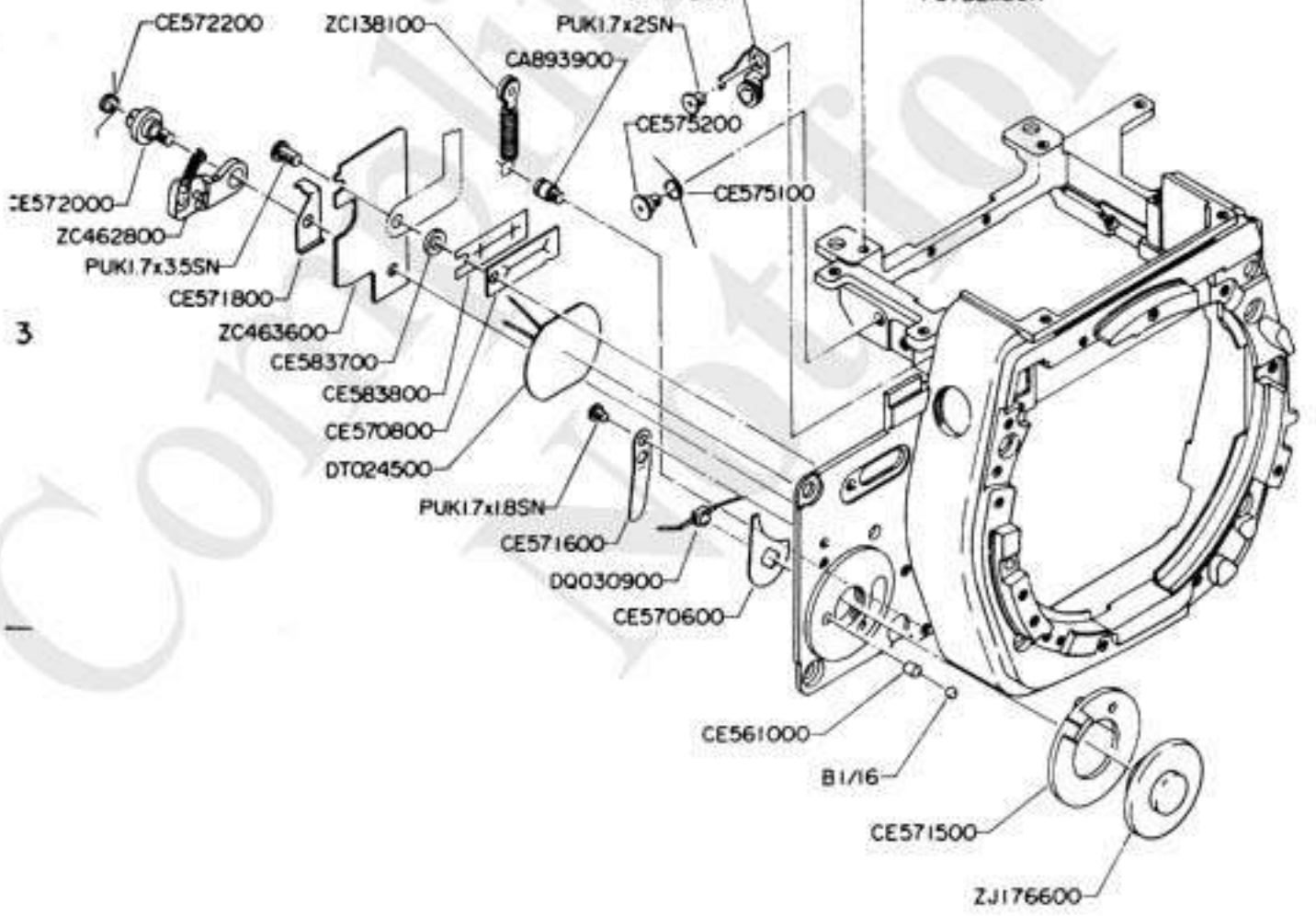

3

—

4

EXPLODED PARTS DIAGRAM

MODEL	HOUSE CODE or UNIT	FIG.
OM-4	MDY-2	9/9
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MDY-2 変更部品表 IMPROVED PARTS TABLE

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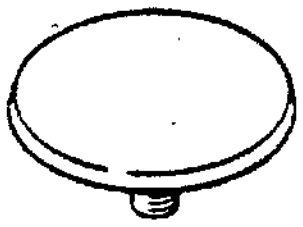

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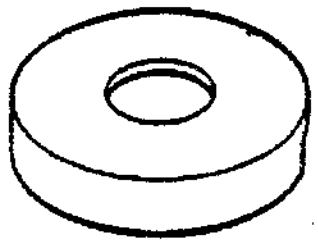

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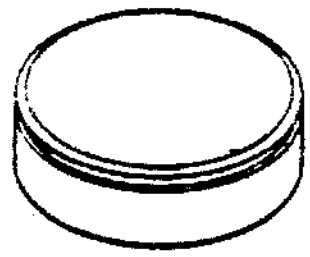

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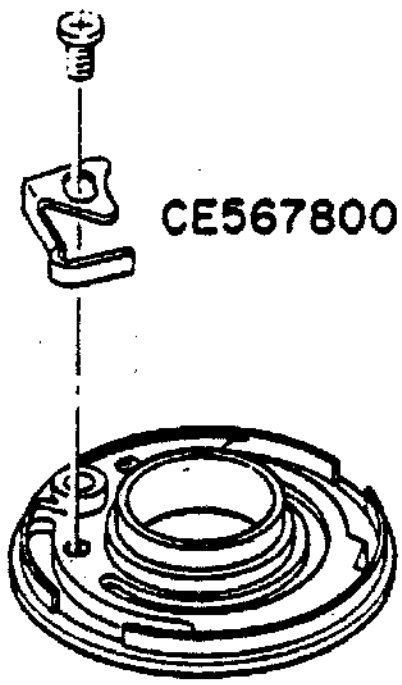

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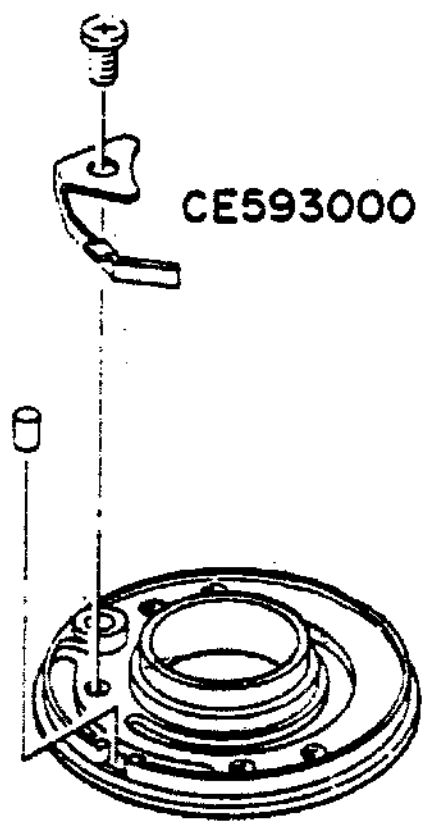

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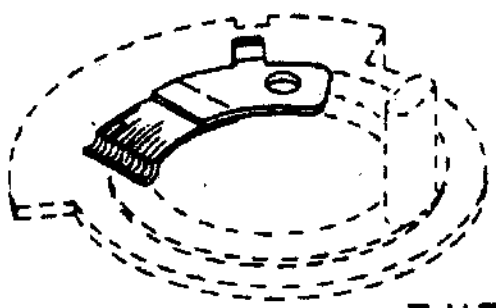

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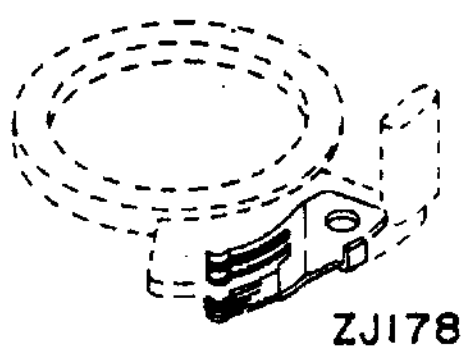

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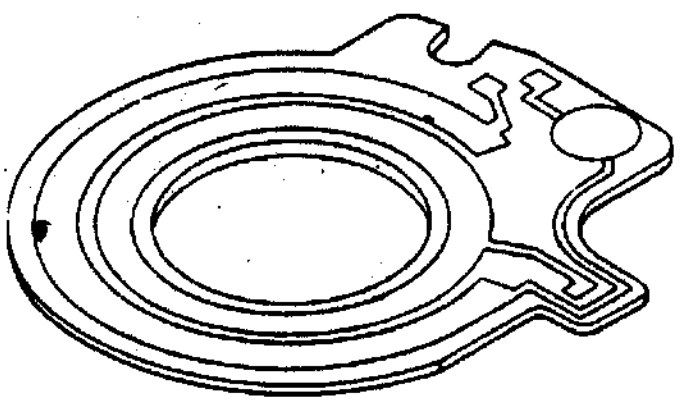

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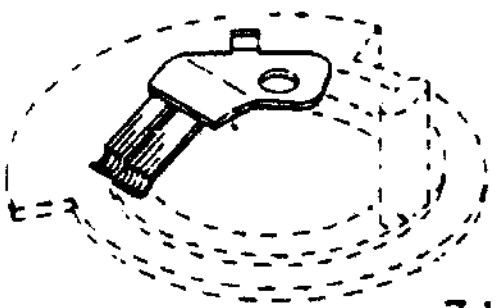

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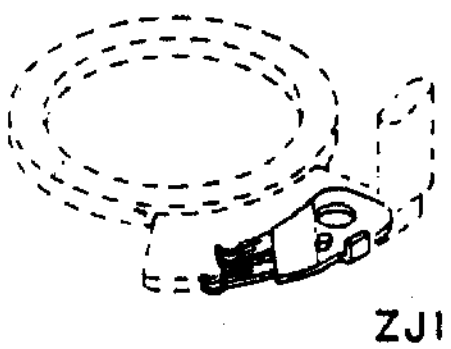

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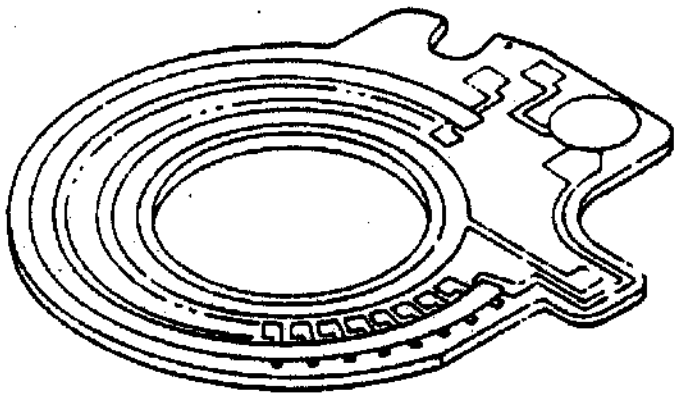

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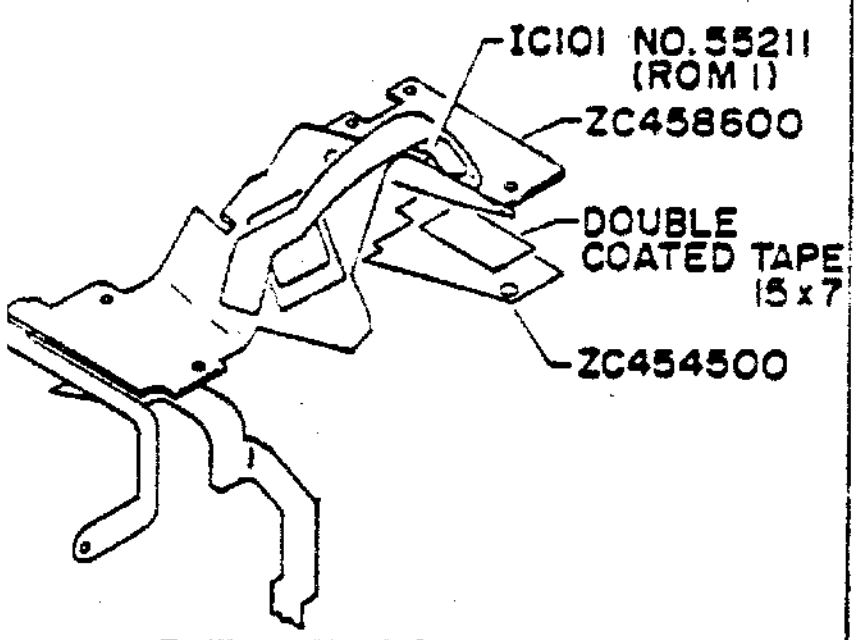
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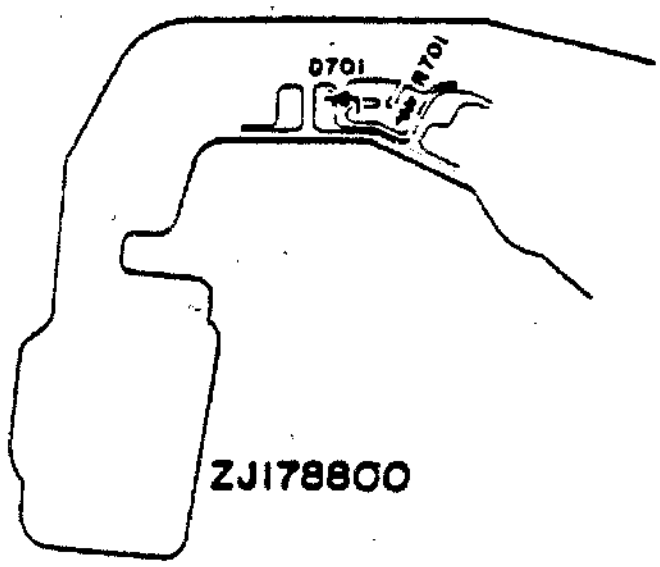
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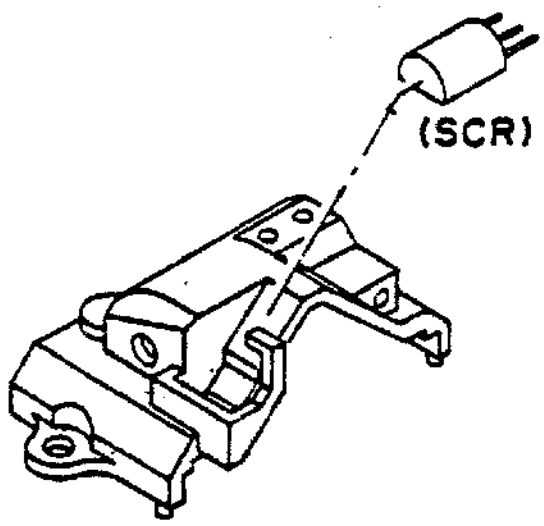
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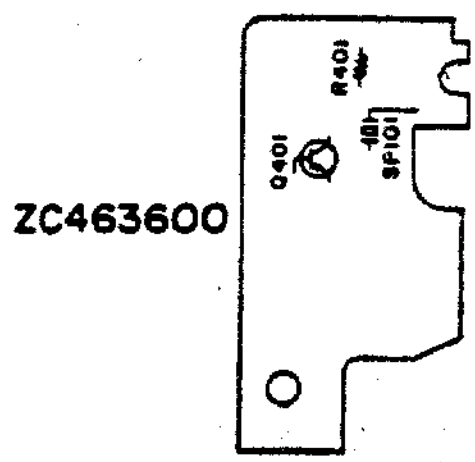
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0401
SP101
ZC463600

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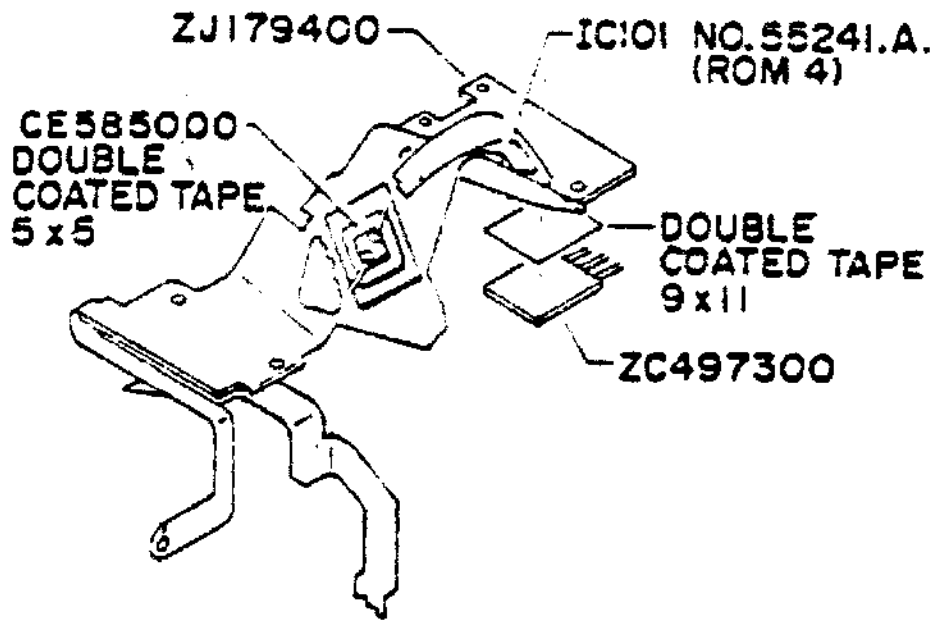
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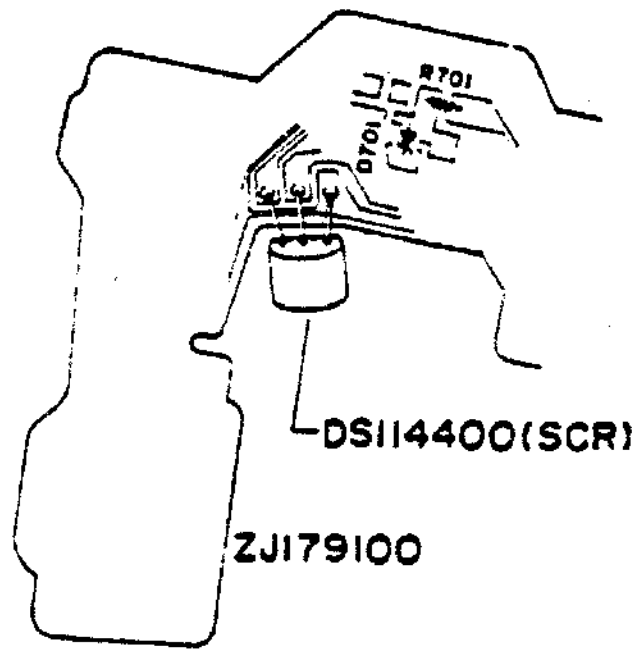
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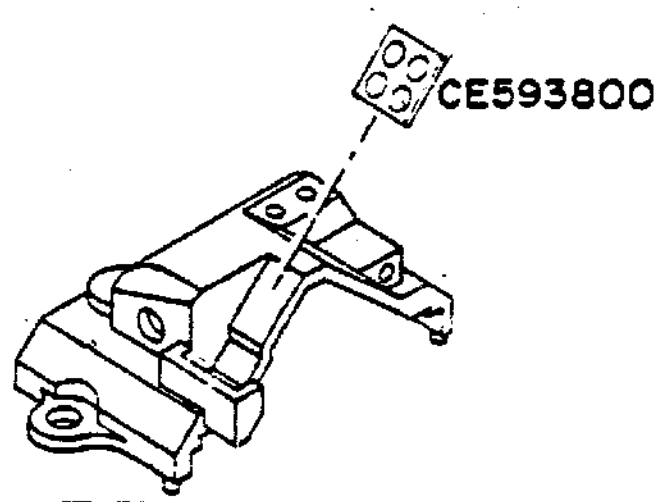
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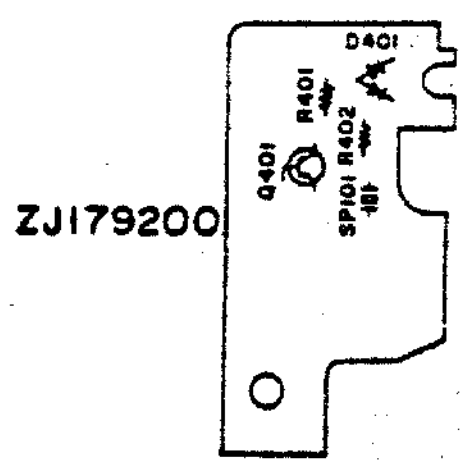
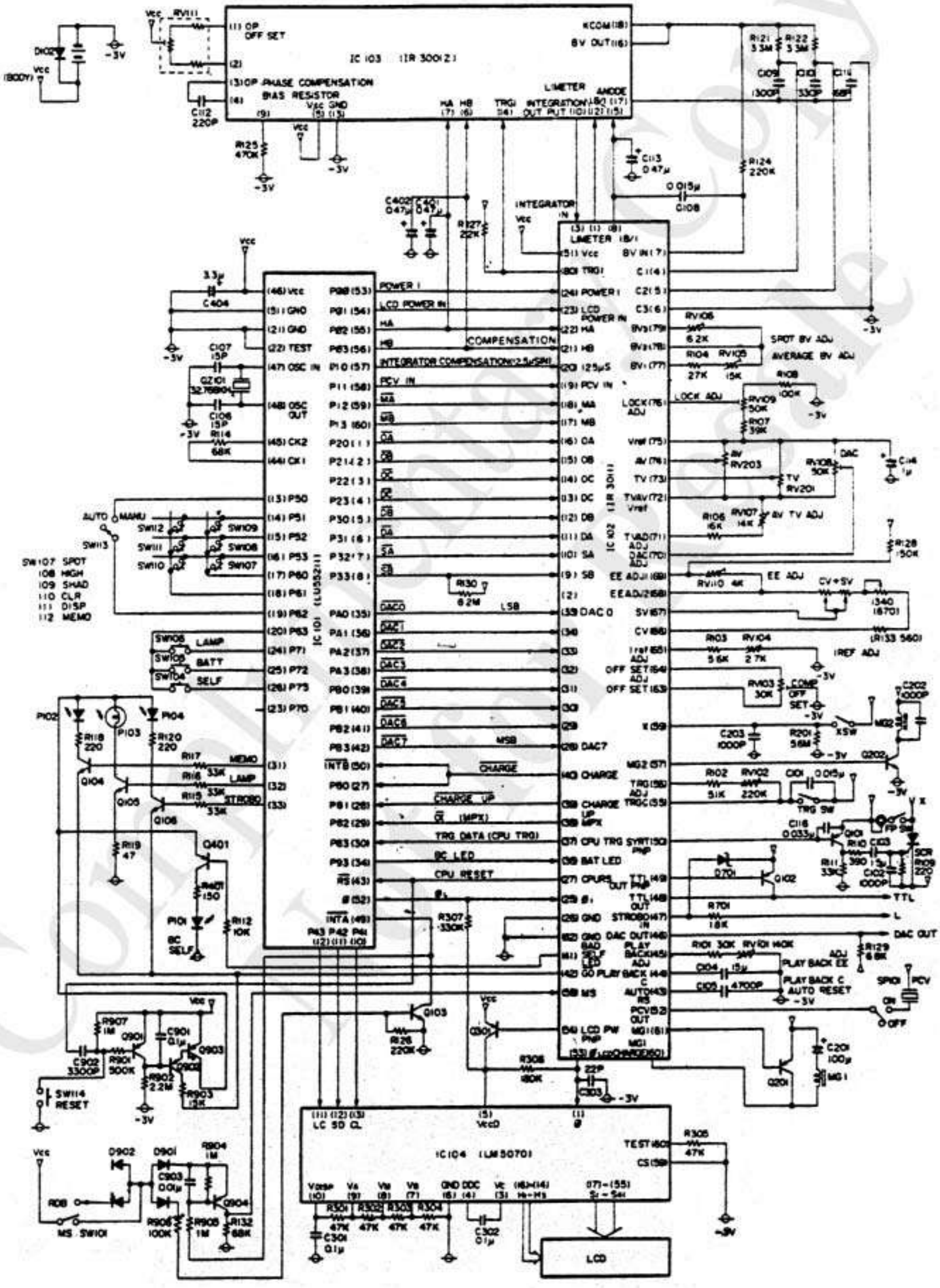

D401
R401
R402
0401
SP101
ZJ179200

MDY2 CIRCUIT DIAGRAM



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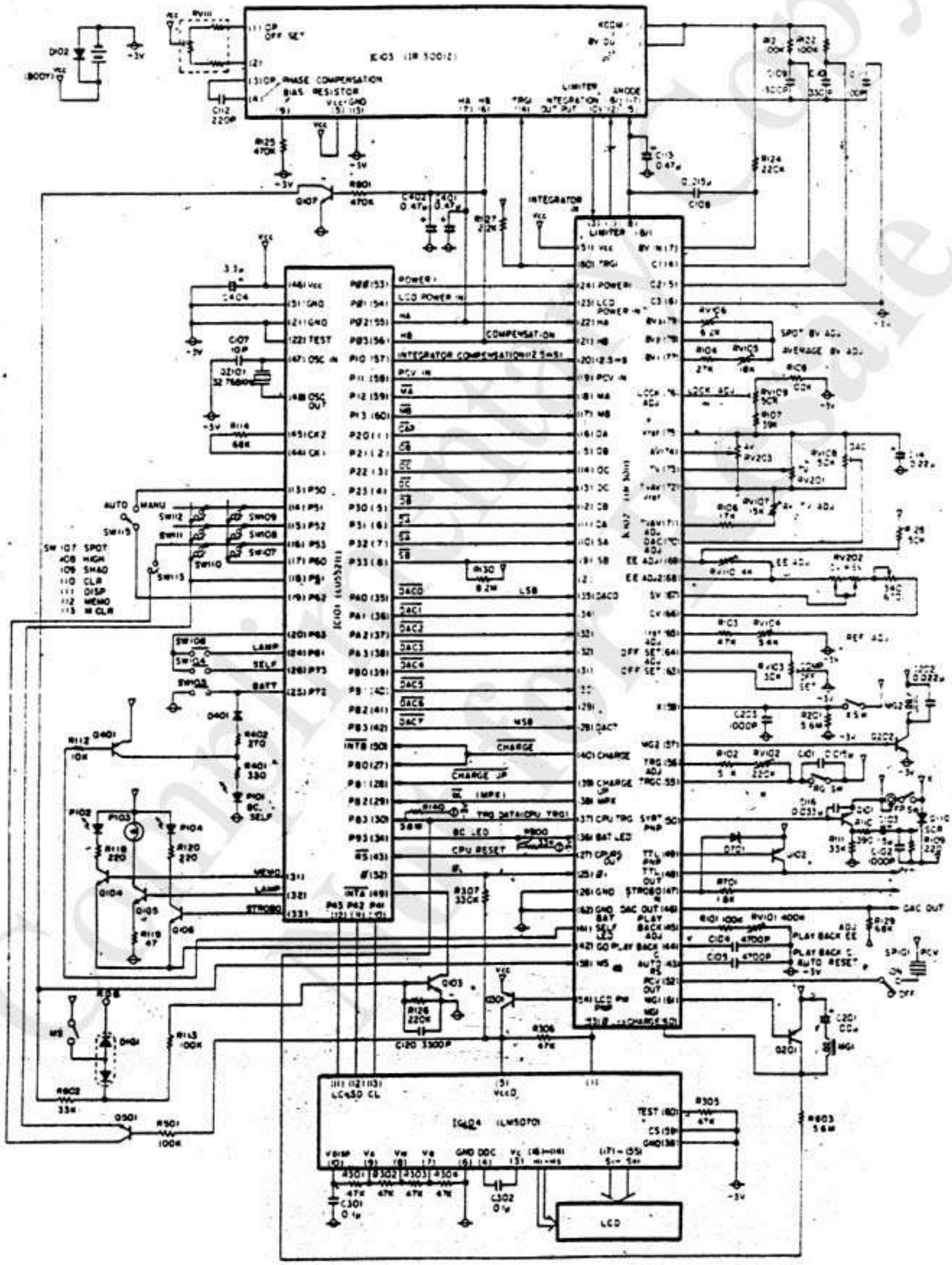
MDY2 CIRCUT DIAGRAM (ROM4)

NO.A-5



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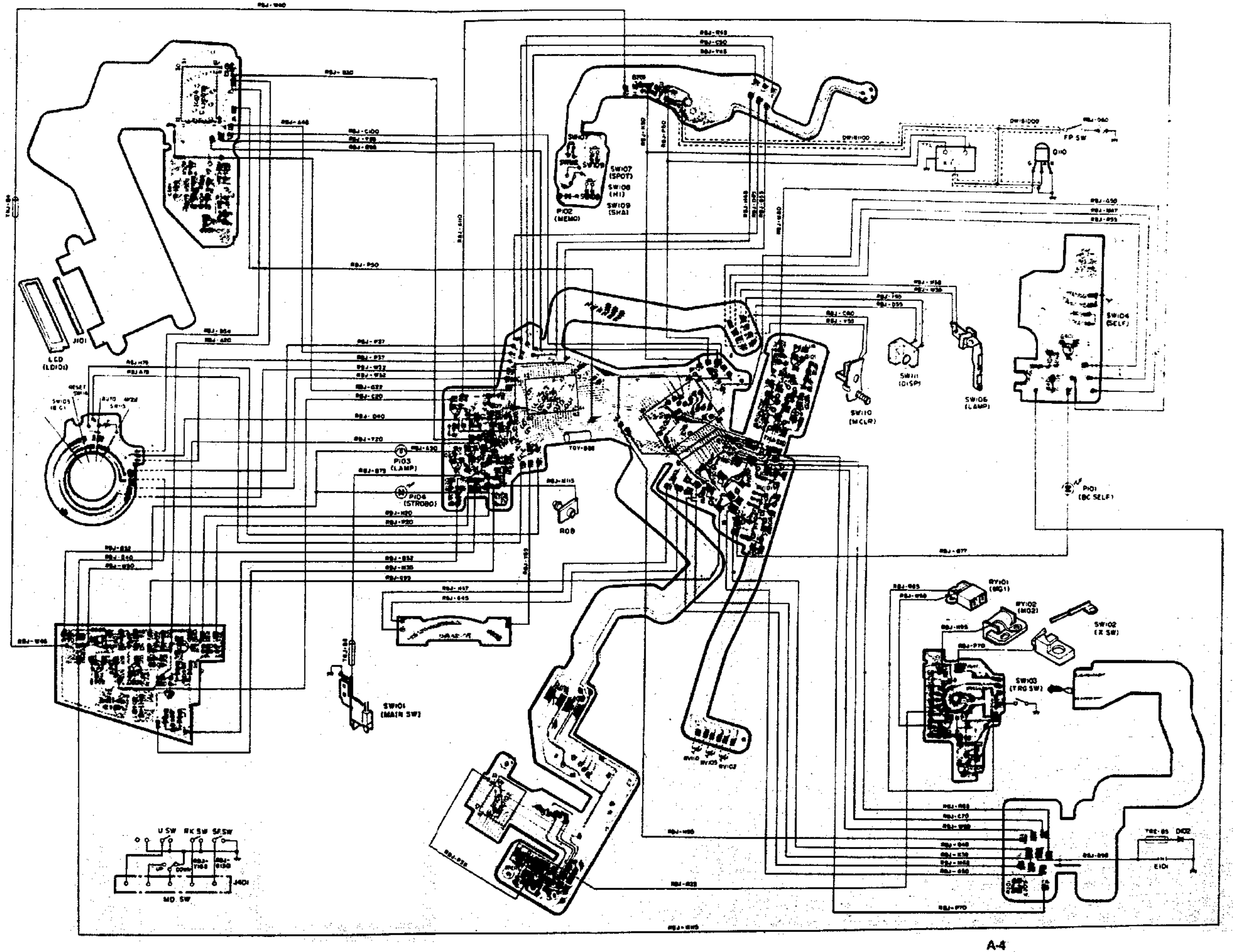
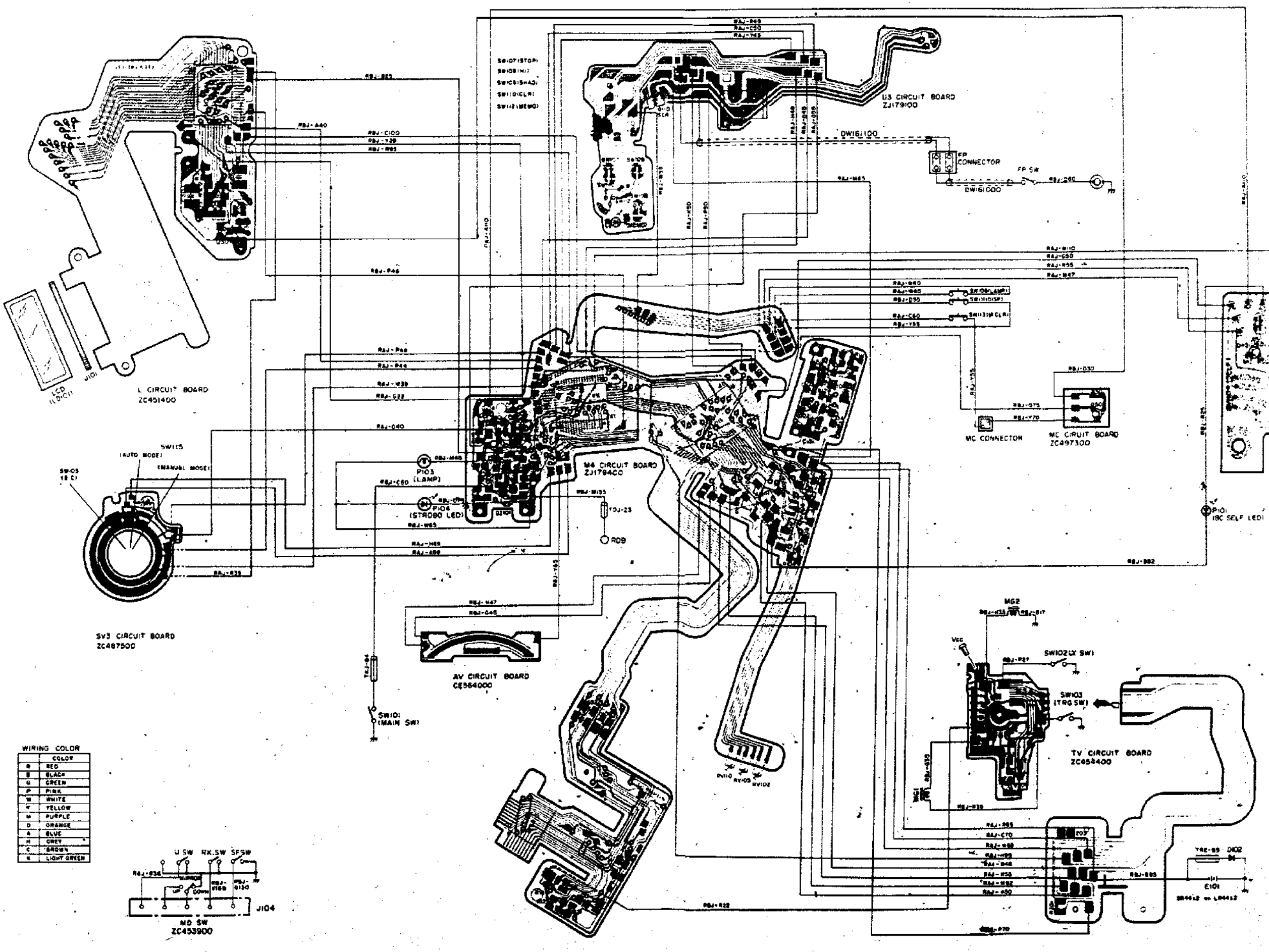
1DY2 WIRING DIAGRAM



MDY2 (ROM4) WIRING DIAGRAM

NO. A-7



WIRING COLOR

	COLOR
R	RED
B	BLACK
G	GREEN
P	PINK
W	WHITE
Y	YELLOW
M	PURPLE
O	ORANGE
A	BLUE
H	GREY
C	BROWN
N	LIGHT GREEN

B. INSPECTION STANDARDS

CONTENTS

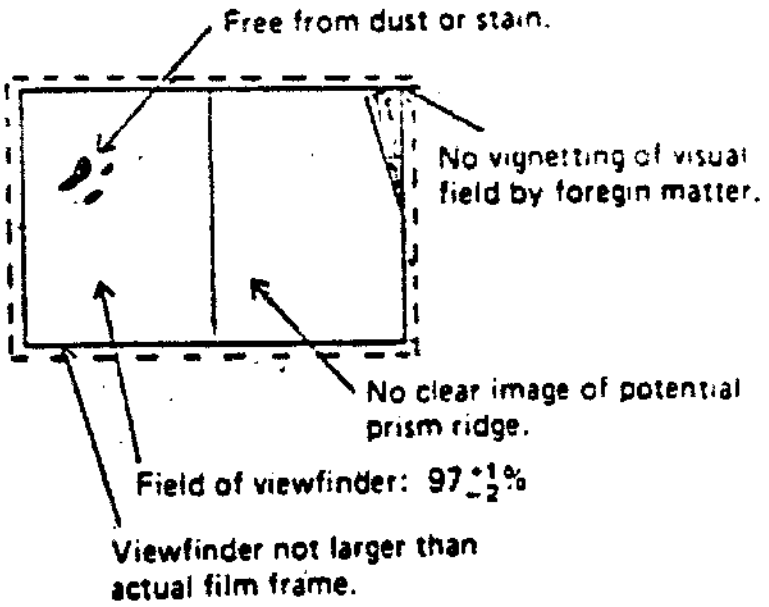
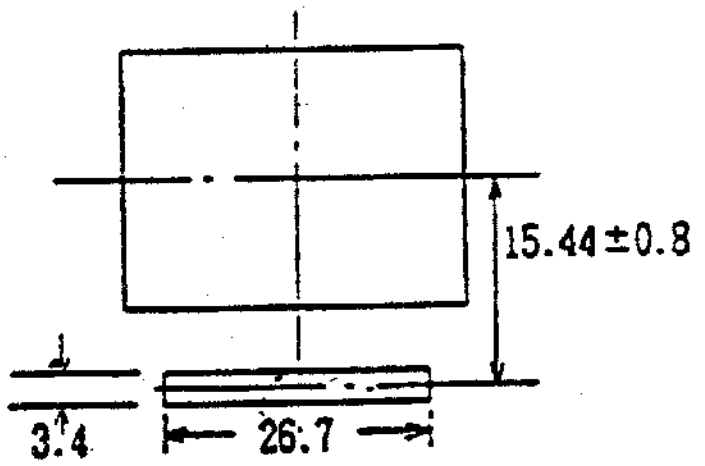
APPEARANCE AND FUNCTIONS

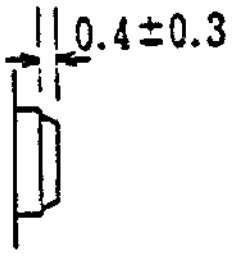
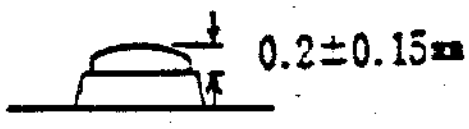
1. Viewfinder ..... B- 1
2. Indication within viewfinder ..... B- 1
3. Spot button ..... B- 2
4. High light button ..... B- 3
5. Shadow button ..... B- 3
6. Clear memory lever ..... B- 4
7. L-pin ..... B- 4
8. F-key ..... B- 5
9. R-knob ..... B- 5
10. Winding lever ..... B- 6
11. Release button ..... B- 7
12. Film counter ..... B- 7
13. Rear cover ..... B- 8
14. Pressure plate ..... B- 8
15. Sprocket ..... B- 8
16. Spool ..... B- 9
17. Shutter dial ..... B- 9
18. B lock button ..... B- 9
19. Rewinding button B-10
20. Mode selector lever B-10
21. ASA dial B-10
22. "±" correction dial B-10
23. Self lever B-11
24. Spot down lever B-11
25. Diaphragm interlock ring B-12
26. Movable mirror B-12
27. B mount B-12
28. Combination with T-series flash (Auto mode) B-12
29. Combination with T-series flash (Manual mode) B-13
30. Combination with T-series flash (B. mecha 1/60) B-13
31. Motor drive B-13

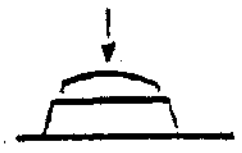
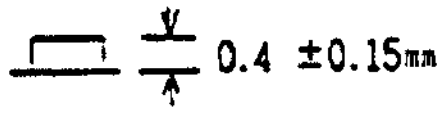
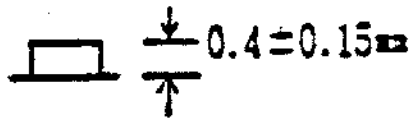
II. PERFORMANCE

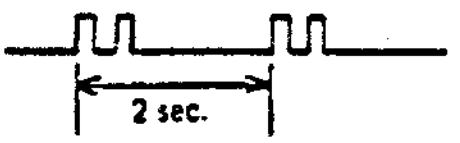
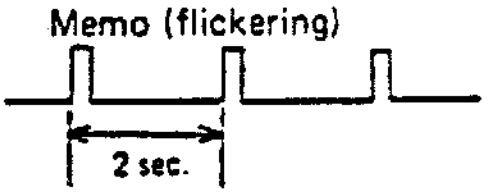
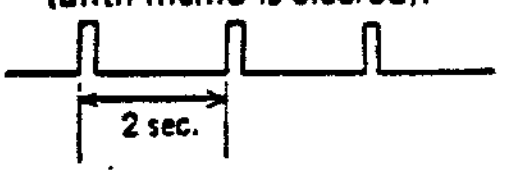
1. Mount back and optical path length B-14
2. Spacing between tunnels B-14
3. Position of perforations B-14
4. Film frame spacing B-14
5. Vertical deviation of actual screen surface B-14
6. Accuracy of automatic exposure B-15
7. Manual time B-16
8. Exposure indication B-17
9. Spot characteristic B-18
10. Time lag B-18
11. Contact efficiency B-18
12. Insulation resistance B-18
13. Indications by B. check lamp, LED and PCV B-18
14. Release lock voltage B-18
15. Unlocking B-18
16. Current consumption B-18
17. Standby current B-18

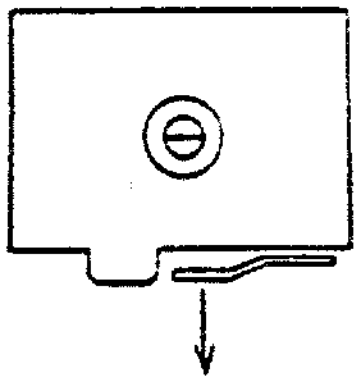
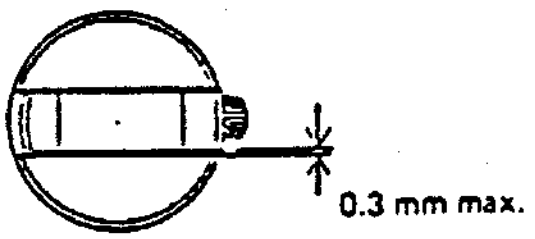
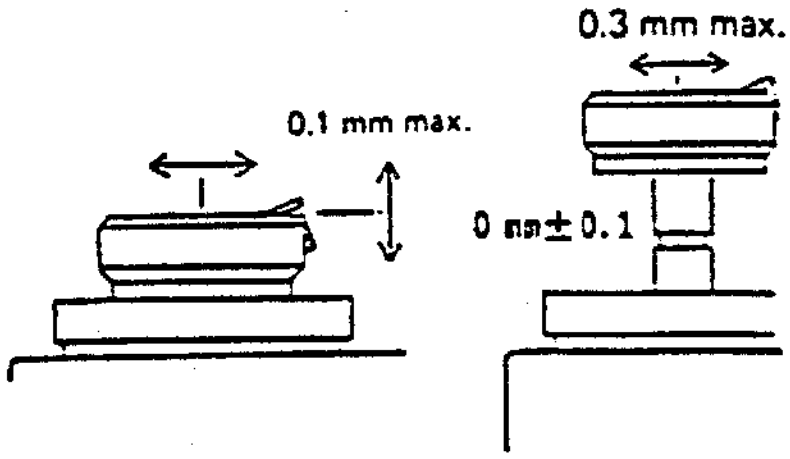
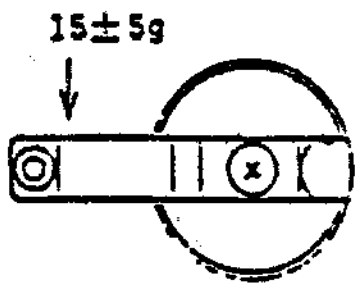
I. APPEARANCE AND FUNCTIONS

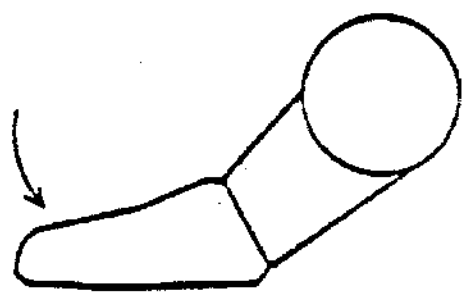
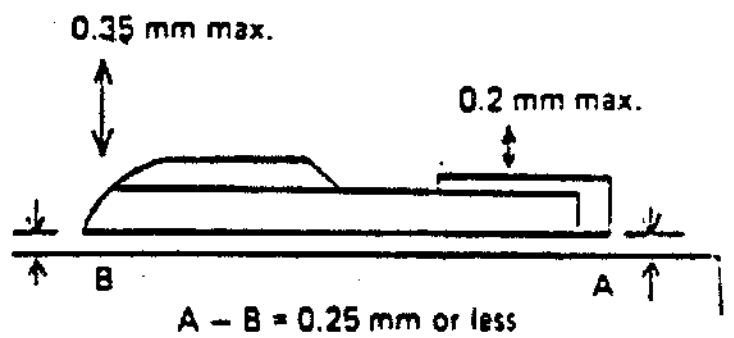
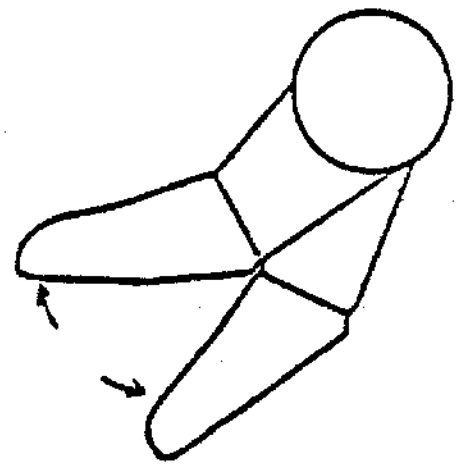
Major check point	Item to be checked	Standard and check procedure
1. Viewfinder	1) Visual field	
	2) Diopter adjustable range	+1.0 to 3.0 diop.
	3) Force required to adjust diopter	Force to pull out adjusting knob: 360 ± 60g Force to turn adjusting knob: 65 ± 25 g·cm (at click position) Force to push in adjusting knob: 360 ± 60g
2. Indication within viewfinder	1) Exposure indicating position	 No remarkable inclination or deviation of the indicator mask from the mask surface. No remarkable inclination of indicator segment relative to the mask, vignetting or deviation. No ununiform thinning or inclination of character in the segment.

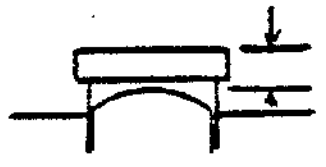
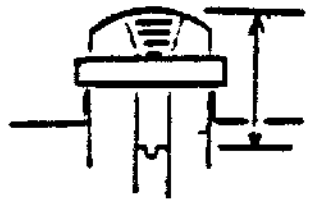
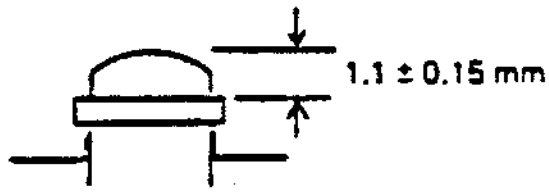
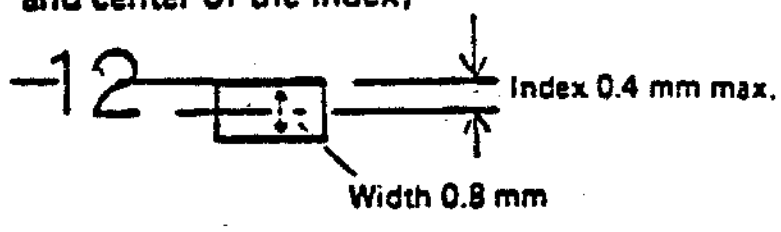
Major check point	Item to be checked	Standard and check procedure
2. Indication within viewfinder	2) Start of indication	Indication must start upon the following operation: Auto → Manual Manual → Auto Flash power lamp ON or OFF by depressing the release button to its first stage. Completion of photographing
	3) Extinguishment of indication	120 ± 50 sec. (Display time must be updated automatically during operation.) B. mecha. set at 1/60 Battery voltage lower than the locked level
	4) Clearing of indication	Upon extinguishment of indication, the Spot mode and memory setting must be cleared automatically.
	5) OVER indication	The OVER lamp must flicker and PCV must sounds when high luminance lasts 1/2000 sec. or longer.
	6) Indication error	Exposure indication must not be erroneous upon switching between Auto and Manual. 0.5 EV or lower (1 segment) Indication must not be erroneous by tilting the camera in either direction. When the camera is equipped with MS5018 lens, influence due to BV15 must be 0.5 EV or less (for 1 segment) at BV10 forward or BV15 backward.
	7) Force required to depress illumination button	180 ± 70g 0.4 ± 0.3 at ON position 
	8) Illumination time	10 ± 10 sec. (Illumination is stopped by turning ON the main switch.)
3. Spot button	1) Operating reliability	The camera must be set in the Spot mode by manipulating the Spot button during indication within the viewfinder in the Manual, Auto or B. check mode. Position of input button: 0.2 ± 0.5 mm 

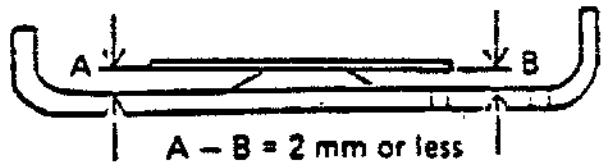
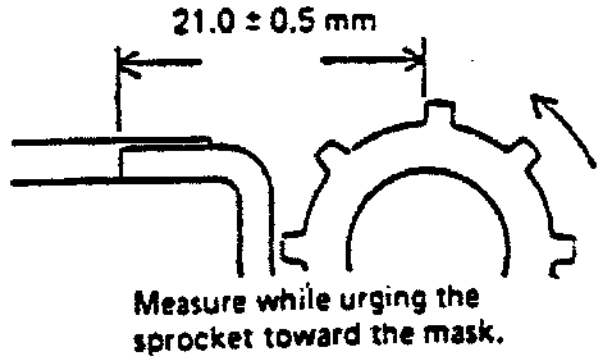
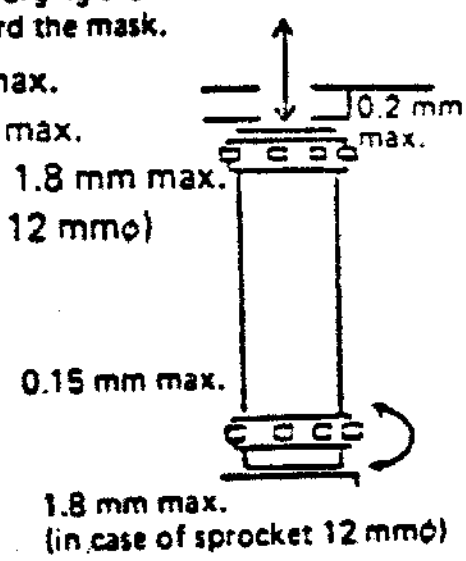
Major check point	Item to be checked	Standard and check procedure
		Indication within viewfinder: SPOT Sound indication: PCV sounds at 2 kHz
	2) Force required to depress spot button	200 ± 50g 
4. High light button	1) Operating reliability	The camera must be set in the Hi light mode by depressing the Hi light button in the Spot mode. The mode must be cancelled by depressing the button once again. Position of input button: 0.4 ± 0.15 mm 
		Indication within viewfinder: Hi light Sound indication: PCV sounds at 2 kHz Hi light should be indicated in the Spot mode only. Shadow must be indicated by depressing the Shadow button during display of Hi light.
	2) Force required to depress Hi light button	200 ± 50g
5. Shadow button	1) Operating reliability	The camera must be set in the Shadow mode by depressing the Shadow button in the Spot mode. The mode must be cancelled by depressing the button once again. Position of input button: 0.4 ± 0.15 mm 
		Indication within viewfinder: Shadow Sound indication: PCV sounds at 2 kHz Shadow should be indicated in the Spot mode only. Hi light must be indicated upon depressing the Hi light button during indication of Shadow.
	2) Force required to depress Shadow button	200 ± 50g

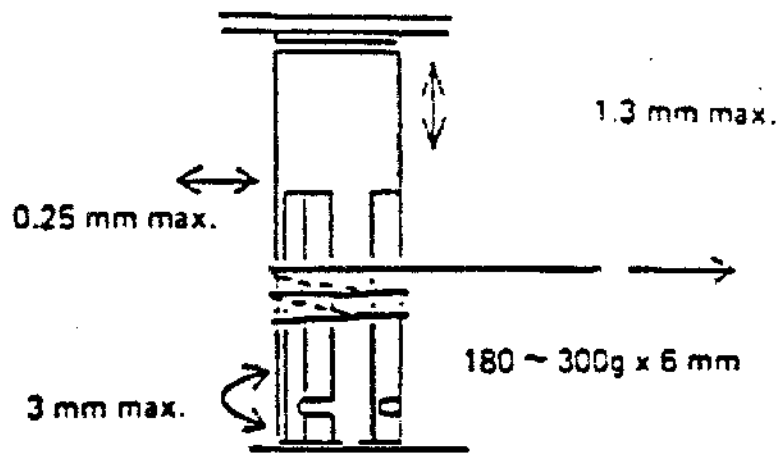
Major check point	Item to be checked	Standard and check procedure
6. Clear memory lever	1) Operating reliability	The camera must be set in the Memo mode by turning the memory level during indication within the viewfinder in the Auto or B. check mode. Indication within viewfinder: Memo Sound indication: PCV sounds at 2 kHz LED indication: The indication memory signal LED must flicker twice at intervals of 2 sec.  The Memo mode must be compatible with the Spot mode and incompatible with the manual mode.
	2) Force required to click in memory	650 ± 150g (must be reset automatically)
	3) Operating reliability (memory hold)	The memory must be held upon releasing the shutter in the Memo mode. Indication within viewfinder: Memo (flickering)  LED indication: The memory hold signal LED must flicker at intervals of 2 sec. (until memo is cleared).  After indication is extinguished in the memory hold condition, it must be kept upon restart of indication. 60 ± 10 min.
	4) Reliability of clearing operation	The clear lever must be effective to set the camera in the average mode by cancelling the Spot or Memo mode. Sound indication: PCV sounds at 2 kHz
	5) Force required to click in clear lever	500 ± 100g (must be reset automatically)
7. L-pin	Operating reliability	Upon detaching the lens, the camera must be set in the average direct mode by cancelling the Spot or Memo mode.

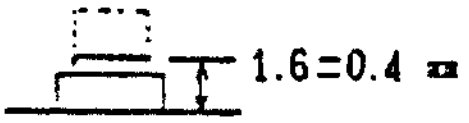
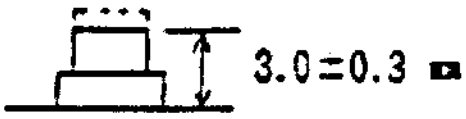
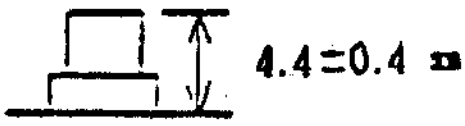
Major check point	Item to be checked	Standard and check procedure
8. F-key	1) Locking reliability	The F-key must be capable of locking film without fail (with a click sound).
	2) Force required to remove F-key	100 ± 30g 
9. R-knob	1) Operating reliability	The knob must be pulled out in two stages (with click feeling). When it is pull up further from the 2nd stage and then released, it must be set automatically at the 2nd stage.
	2) Force required to pull out R-knob	400 ± 100g to pull out to the 1 stage 1200 ± 300g to pull out to the 2nd stage
	3) Rattling of R-knob	No vertical rattling 0.1 mm max. in back-force and right-left direction in stored position. 0.3 mm max. at tip of the rewinding knob in pulled-out position. Gap between the knob and crank:  
	4) Spring force of R-lever	30 to 40g at raising start of the lever tip
	5) Friction	15 ± 5g on the knob (with no film loaded) 

Major check point	Item to be checked	Standard and check procedure
10. Winding lever	1) Operating reliability	A single stroke of the winding lever must cause film feeding to the next frame and charging of the shutter and mirror without fail.
	2) Smoothness of operation	The winding lever must operate smooth with no remarkable seizure, rattling, friction, creak or abnormal noise at the initial stage.
	3) Force required for turning	1.3 kg max. as measured at the lever tip with film loaded. 
	4) Rattling of winding lever	 A – B = 0.25 mm or less Rattling in back-forth or right-left direction: 0.1 mm max.
	5) Force for spare pull-out	100 ± 50g as measured at lever tip
	6) Angle for spare pull-out	30 ± 5° 

Major check point	Item to be checked	Standard and check procedure
11. Release button	1) ON position of indication switch	The indication switch must be turned ON at a position 0.6 ± 0.3 mm as measured from the top surface of the button seat.
	2) Releasing position	The shutter must be released when the button is depressed 0.6 ± 0.15 mm as measured from the top surface of the button seat. 
	3) Depth of releasing core	The shutter should be released when the releasing core is set 6.5 ± 0.5 mm as measured from the button top. 
	4) Reset position of switch	The switch must be turned OFF when it is reset to a position 1.1 ± 0.15 mm as measured from the top of the button seat. 
	5) Force required to release shutter	Force to turn ON switch: 50 ± 10g Force to release shutter: 260 ± 60g
	6) Rattling of release button	No vertical rattling Tilting: 0.25 max.
12. Film counter	1) Alignment between index and counter character	0.4 mm max. (deviation between center of character height and center of the index) 
	2) Indication of "No. 1"	After closing the rear cover, "No. 1" must be indicated by feeding three film frames.
	3) Operating reliability	The film counter must advance 1 step each time a single frame if fed. The film counter must stop when "E" is indicated. The film counter must return to "S" upon opening the rear cover at any film position.

Major check point	Item to be checked	Standard and check procedure
13. Rear cover	1) Closing reliability	The rear cover must not be opened by depressing any part of it. The rear cover must not by opened by weight of the camera when the R-knob is raised. The rear cover must be opened by pulling the R-knob to the 2nd stage.
	2) Rattling and tilting of rear cover	Back-forth rattling: 0.5 mm max. Tilting: 0.5 mm max.
	3) Rattling of hinge	0.15 mm max.
	4) Gap between rear cover and upper/lower plate	0.9 mm max. with no deviation
	5) Gap around key cover	0.5 mm max.
	6) Force required to close rear cover	1 to 2 kg
14. Pressure plate	1) Force of pressure plate	600 ± 100g on sprocket side 250 ± 50g on patrone side with the rear cover closed
	2) Parallelism of pressure plate	Within 0.2 mm relative to the rear cover when it is closed. 
	3) Rattling of pressure plate	0.25 max. in any direction
15. Sprocket	1) Position of tooth	21.0 ± 0.5 mm as measured from the mask to the sprocket tooth. 
	2) Rattling of sprocket	Vertical: 0.2 mm max. Radial: 0.15 mm max. Rotating direction: 1.8 mm max. (in case of sprocket 12 mmϕ) 

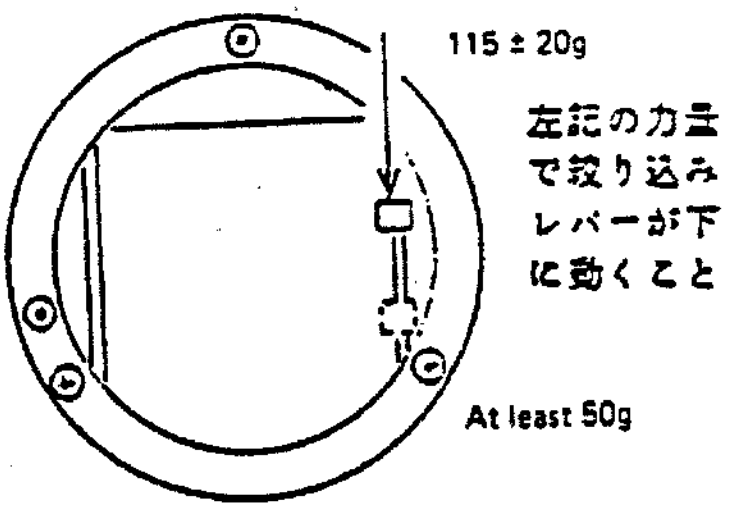
Major check point	Item to be checked	Standard and check procedure
16. Spool	1) Rattling of spool	Vertical: 1.3 mm max. Radial: 0.25 mm max.
	2) Force required to turn spool	
17. Shutter dial	1) Clicking force	Force required to disengage click: 2 ± 0.6 kg·cm Intermediate section: 600 ± 300 g·cm
	2) Rattling	0.15 mm max. at position of the index. Thrusting or radial rattling: 0.1 mm max.
	3) Indicating deviation	Deviation: Within ±0.3 mm V1, 2, 4 and 8 within ±0.3 mm of the character center Plural characters within ±0.3 mm of the position specified for each character row: 15 → 15 0.72 mm 30 → 30 0.77 mm 60 → 60 0.72 mm 125 → 125 1.38 mm 250 → 250 1.49 mm 500 → 500 1.49 mm 1000 → 1000 1.55 mm 2000 → 2000 0.51 mm
18. B lock button	1) Operating reliability	The B lock button must be operated optionally from 1/2000 to 1 sec., and must not turn from 1 sec. to mechanical 1/60. When the B lock button is depressed $0.3^{+0.2}_{-0.1}$ mm, it must release the B lock and turns from 1 sec. to mechanical 1/60.
	2) Force required to depress B lock button	120 ± 40g
	3) Release of memory hold condition	The memory hold condition must be cancelled by turning to B mechanical 1/60.

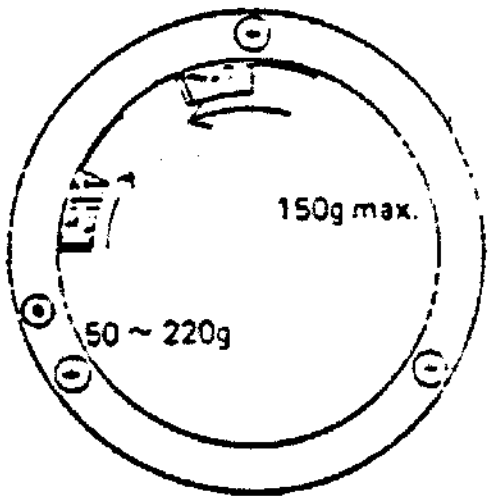
Major check point	Item to be checked	Standard and check procedure
19. Rewinding button	1) Operating reliability	The sprocket must turn idly without fail by setting the rewinding button. Depressed position of rewinding button:  1.6±0.4 mm Position to actuate clutch (button height):  3.0±0.3 mm
	2) Resetting reliability	Upon next depression of the winding button the button must be reset within 3/4 turn of the sprocket and film must be wound without fail.  4.4±0.4 mm
	3) Force required to depress rewinding button	450 ± 50g
20. Mode selector lever	1) Operating reliability	Modes must be easily selectable without fail. The keys (Spot, Hi light, Shadow, Clear and Memo) must be effective in the B. check mode.
	2) Clicking force	Auto ↔ Manual 375 ± 80g Auto ↔ B. check 375 ± 80g
	3) Indication of B. check mode	The B. check mode must be indicated by the LED and PCV without fail.
	4) Cancelling of memory hold condition	The memory hold condition must be cancelled by changing the mode.
21. ASA dial	1) Operating reliability	Deviation of the index: Within its width Radial rattling: 0.3 mm max.
	2) Force required to raise ASA dial	450 ± 100g
22. "±" correction dial	1) Correcting reliability	Deviation of the index: Within ±0.2 mm Indication within viewfinder: "+" mark flickers
	2) Clicking force	400 ± 100 g·cm

Major check point	Item to be checked	Standard and check procedure
	3) Correctable range	

	+2	+1	0	−1	−2
6	/	/			
12	/				
25					
40					
64					
100					
200					
400					
800					
1600					/
3200				/	/

Blank columns indicate correctable ranges.

23. Self lever	1) Operating reliability of self-timer	Upon releasing the shutter, the self-timer must start operating with sound and LED indications without fail.
	2) Time set by self-timer	12 ± 3 sec.
	3) Force required to turn lever	220 ± 80g as measured at the lever tip
	4) Flickering interval	LED frequency 2 Hz PCV frequency 2 Hz, sounding tone at 4 kHz
24. Stop down lever	Force required to turn lever	
	Force required to return lever	

Major check point	Item to be checked	Standard and check procedure
25. Diaphragm interlock	Force required to turn ring	
26. Movable mirror	1) Smoothness of motion	The mirror must move without breathing or abnormal noise.
	2) Shutter releasing position	The 1st curtain must be sent out when the mirror tip rises at least 8 mm above the film center.
27. B mount	1) Torque required for mounting and dismounting standard lens	4 to 7 kg·cm
	2) Locking reliability	The B mount must be locked at its stop position without fail. Deviation of the index due to rotational rattling: Within 0.2 mm
28. Combination with T-series flash (Auto mode)	1) Operating reliability	When T-series flash is mounted and the switch is turned ON in the Spot or Memo mode, it must be switched to the average direct mode. In the Auto mode, the flash must not glow at bar indication of speed higher than 1/60 sec. The flash must glow at 1/60 sec. or lower speed. TTL auto must be settable in the Auto mode even while the flash is set in the manual or ordinary auto mode.
	2) Indicating reliability	"▷◁" mark must be indicated on both sides of SS 1/60 when the flash switch is turned ON. " ϟ " mark must be indicated upon completing charging of the flash. " ϟ " mark must flickers when light intensity becomes adequate after flashing. "UNDER" must flicker when flash intensity is under 0.5 ± 0.3 EV or the strobe does not flash at shutter speed of 1/60. "OVER" must flicker when flash intensity exceeds 1 ± 0.3 EV.

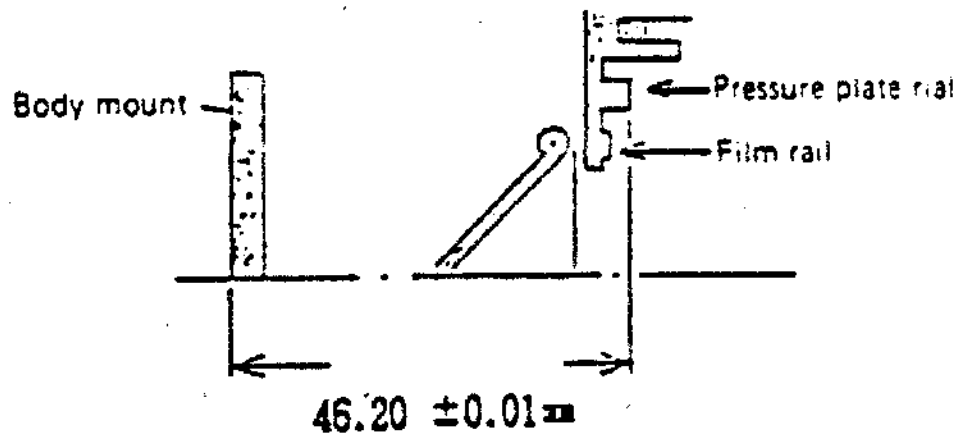
Major check point	Item to be checked	Standard and check procedure
29. Combination with T-series flash (Manual mode)	1) Operating reliability	The strobe must be capable of flashing at all the shutter speeds.
	2) Indicating reliability	" ϟ " mark must be indicated upon completing charging.
30. Combination with T-series flash (B. mecha 1/60)	1) Operating reliability	The strobe must flash when battery voltage exceeds the lock voltage. The strobe must not flash when battery voltage is lower than lock voltage.
	2) Indicating reliability	" ϟ " mark must be indicated upon completing charging.
31. Motor drive	1) Operating reliability	Film must be wound without fail when the motor drive and winder are set in position.
	2) Force required to operate releasing plate	180 ± 20g
	3) Release lock	At least 2.5 mm
	4) Releasing position	2 ± 0.4 mm
	5) Contact	Insulator position from F plate: 0 ± 0.05 mm Contact position from F plate: 0.1 ± 0.2 mm
	6) Continuity and insulation resistance	0.2Ω max. in continuous condition Insulation resistance at least 50 MΩ at 20V (between contact and body)

II. PERFORMANCE

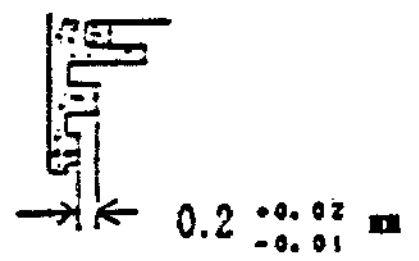
1. Mount back and optical path length

Optical path length of viewfinder
46.05 ± 0.02 mm

Mount back
46.20 ± 0.02 mm
Standard for pressure plate rail

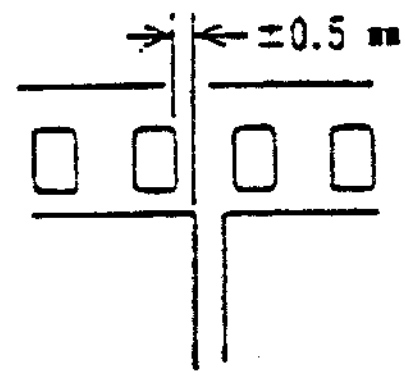


2. Spacing between tunnels



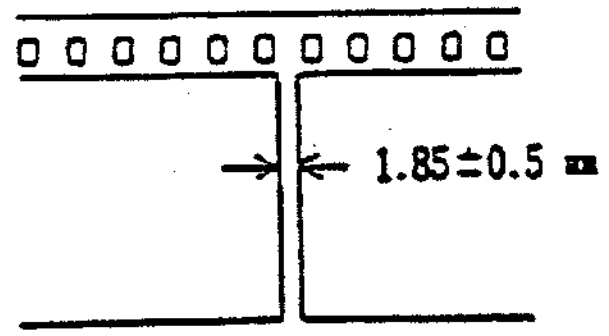
3. Position of perforations

The perforations must not be located within a range of ± 0.5 mm of the center line between succeeding film frames.



4. Film frame spacing

1.85 ± 0.5 mm in normal film winding condition
At least 0.6 mm in abnormal film winding condition



5. Vertical deviation of actual screen surface

The screen must not overlap with the perforations.

6. A. Accuracy of automatic exposure

F5.6, new battery x 2, K = 1.3

Luminance	Central value	Standard for adjustment	Standard for inspection	ASA
BV15	0	+0.65 ~ −0.15 EV	−0.7 ~ +0.75 EV	200
BV14	0	0 ± 0.3 EV	0 ± 0.1 EV	100
BV10	0	0 ± 0.05 EV	0 ± 0.3 EV	100
BV7	0	0 ± 0.3 EV	0 ± 0.3 EV	100
BV4	0	0 ± 0.3 EV	0 ± 0.3 EV	100

B. ASA switching accuracy

Standard conditions: F4, BV7, ± correction, ASA (ISO) 100, SS 1/8

ASA switching	Standard for adjustment	Standard for inspection
6 ~ 12	0 ± 0.4 EV	±0.4 EV
25 ~ 50	0 ± 0.4 EV	±0.3 EV
100	0 ± 0 EV	± 0 EV
200 ~ 400	0 ± 0.3 EV	±0.3 EV
800 ~ 1600	0 ± 0.4 EV	±0.4 EV
3200	0 ± 0.4 EV	±0.7 EV

NOTE: Difference between neighboring ASA levels is 0.6 EV/EV.

C. ± correction accuracy

Standard conditions: F4, BV7, ASA (ISO) 100 ± 0 EV, SS 1/8

± correction value	Standard for adjustment	Standard for inspection
−2 EV	±0.4 EV	±0.4 EV
−1 EV	±0.3 EV	±0.3 EV
±0 EV	±0 EV	±0 EV
+1 EV	±0.3 EV	±0.3 EV
+2 EV	±0.4 EV	±0.4 EV

7. Manual time

Time	Central value	Standard for adjustment	Standard for inspection
1/2000	0.49	0.30 ~ 0.75 ms	0 ± 0.70 ~ +0.62
1/1000	0.98	0.79 ~ 1.20	0 ± 0.3
1/500	1.95	1.59 ~ 2.40	0 ± 0.3
1/250	3.91	3.40 ~ 4.49	0 ± 0.2 EV
1/125	7.82	6.80 ~ 8.97	0 ± 0.2 EV
1/60	15.6	13.6 ~ 17.9	0 ± 0.2 EV
1/30	31.3	27.2 ~ 35.9	0 ± 0.2 EV
1/15	62.5	54.4 ~ 71.8	0 ± 0.2 EV
1/8	125	109 ~ 143	0 ± 0.2 EV
1/4	250	218 ~ 287	0 ± 0.2 EV
1/2	500	435 ~ 574	0 ± 0.2 EV
1/1	1000	871 ~ 1149	0 ± 0.2 EV
Mecha 1/60	15.6	14.6 ~ 19.9	0 ± 0.1 ~ +0.35

Battery voltage: 3.0 ± 0.05V

Curtain speed: X10.9$^{+0.1}_{-0.15}$ ms (at 20°C)
(Variation during 25 shutter releasing operations, except the first)
Difference between the 1st and 2nd curtain speeds: X0.06 ms max.
(Variation during 25 shutter releasing operations, except the first)

Disturbance: 0.05
(Variation during 25 shutter releasing operations, except the first)

Exposure variation: 0 ± 0.35 EV at shutter speed of 1/1000 to 1/2000 (for B channel)
0 ± 0.40 EV at shutter speed of 1/500 or lower (for B channel)

Difference between neighboring shutter speeds:
1 ± 0.3 EV at shutter speeds of 1/1 to 1/500
1 ± 0.4 EV at shutter speeds of 1/1000 to 1/2000

8. Exposure indication

A. Indication accuracy (average mode)

Conditions: F4, ISO (ASA) 100,
MS5018 standard lens

Luminance	Indication	Standard
BV16	OVER	
BV14	1/1000	±0.5 EV (in 1 segment)
BV11	1/125	±0.5 EV (in 1 segment)
BV8	1/15	±0.5 EV (in 1 segment)
BV4	IS	±0.5 EV (in 1 segment)

Difference within ±0.5 EV as compared with Spot at BV9 (in 1 segment).

B. ISO switching accuracy

Standard conditions: F4, ISO (ASA) 100, MS5018 standard lens, ISO 100, SS 1/15

ISO	Indication	Standard
3,200	1/500	±0.5 EV (in 1 segment)
1,600	1/250	±0.5 EV (in 1 segment)
800	1/125	±0.5 EV (in 1 segment)
400	1/60	±0.5 EV (in 1 segment)
200	1/30	±0.5 EV (in 1 segment)
100	1/15	±0 EV
50	1/8	±0.5 EV (in 1 segment)
25	1/4	±0.5 EV (in 1 segment)
12	1/2	±0.5 EV (in 1 segment)
6	1/1	±0.5 EV (in 1 segment)

Step between neighboring ISO levels must be at least 2/3 EV per EV (in 2 segments).

C. ± correction accuracy

Standard conditions: F4, BV8, ISO (ASA) 100 ± 0 EV, SS 1/15

Correction value	Indication	Standard
−2 EV	1/60	±0.5 EV (in 1 segment)
−1 EV	1/30	±0.5 EV (in 1 segment)
±0 EV	1/15	±0 EV
+1 EV	1/8	±0.5 EV (in 1 segment)
+2 EV	1/4	±0.5 EV (in 1 segment)

At least 2/3 EV per EV (in 2 segments)
Difference between automatic exposure time and indicated time must be within 1 EV (for typical object).

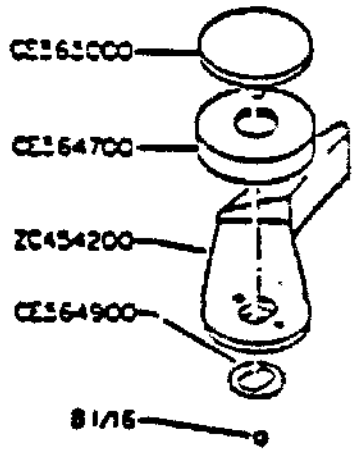
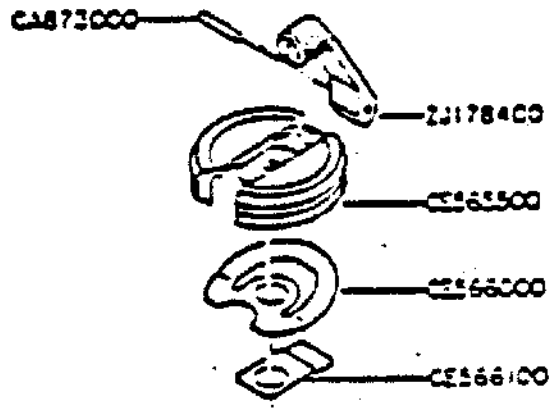
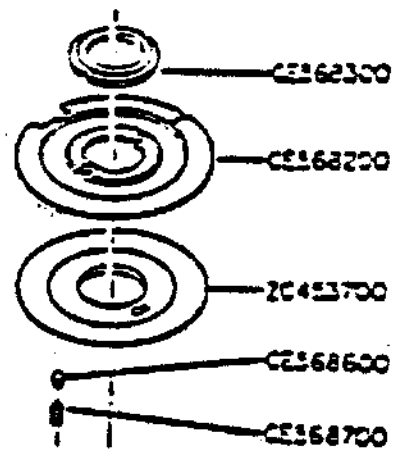
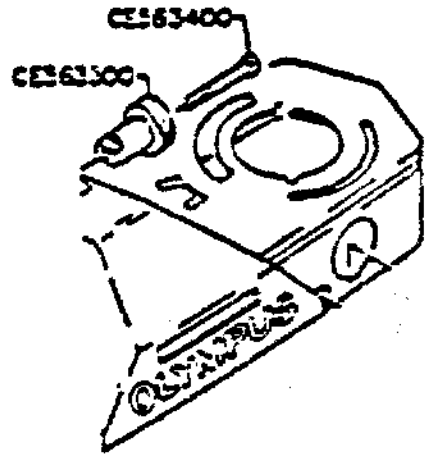
D. Spot indication	Indication of Shadow	The bar must be indicated 2-2/3 EV toward the "+" side from the minimum luminance of spot input value.
	Hi light	The bar must be indicated 2 EV toward the "—" side of the maximum luminance of spot input value.
9. Spot characteristic		The photosensor must exhibit the maximum sensitivity for a light source ϕ1 located within the split of screen 1-13.
10. Time lag		0.1 to 0.5 ms
11. Contact efficiency		At least X50% at intervals of 1 ms at a shutter speed of 1/60 sec.
12. Insulation resistance		At least 30Ω at 500V
13. Indications by B. check lamp, LED and PCV		Judging voltage 2.65V ± 0.05V Warning voitage: Lock voltage 0.1 ± 0.05V
14. Release lock voltage		2.65 ± 0.05V
15. Unlocking		The lock must be released at a voltage exceeding 2.95V without fail.
16. Current consumption		10 ± 3 mA for illumination within viewfinder 4 ± 1 mA for Memo indication 4 ± 1 mA for color illumination 5 ± 1 mA for self-timer 5 ± 1 mA for B. check Approx. 8 mA during shutter operation
17. Stnadby current		Approx. 35 μA as measured with a digital circuit tester.

C. DISASSEMBLING PROCEDURES

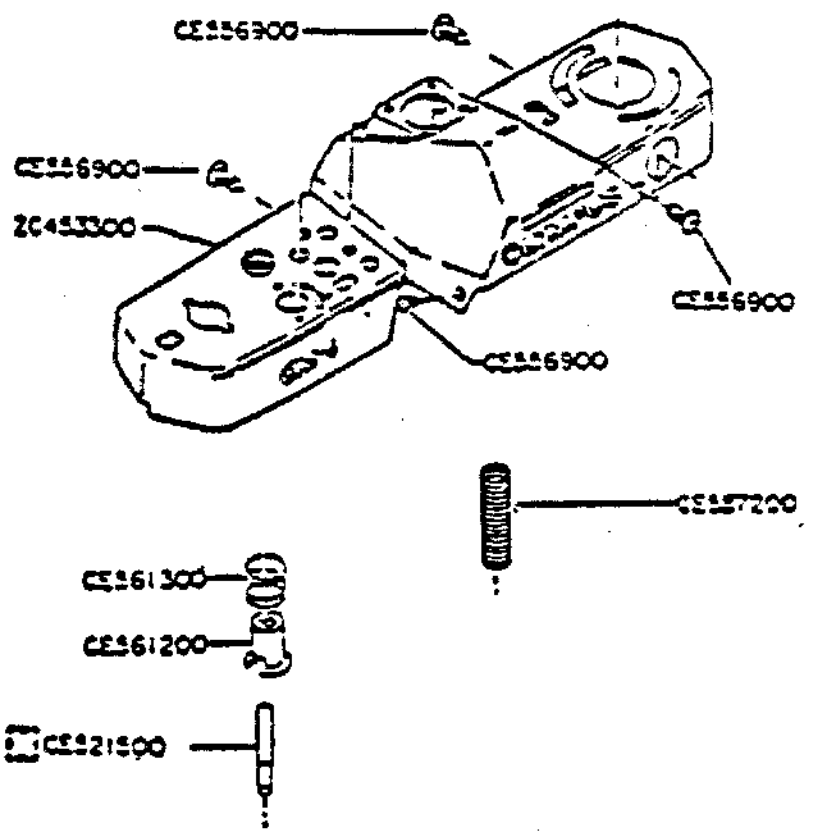
CONTENTS

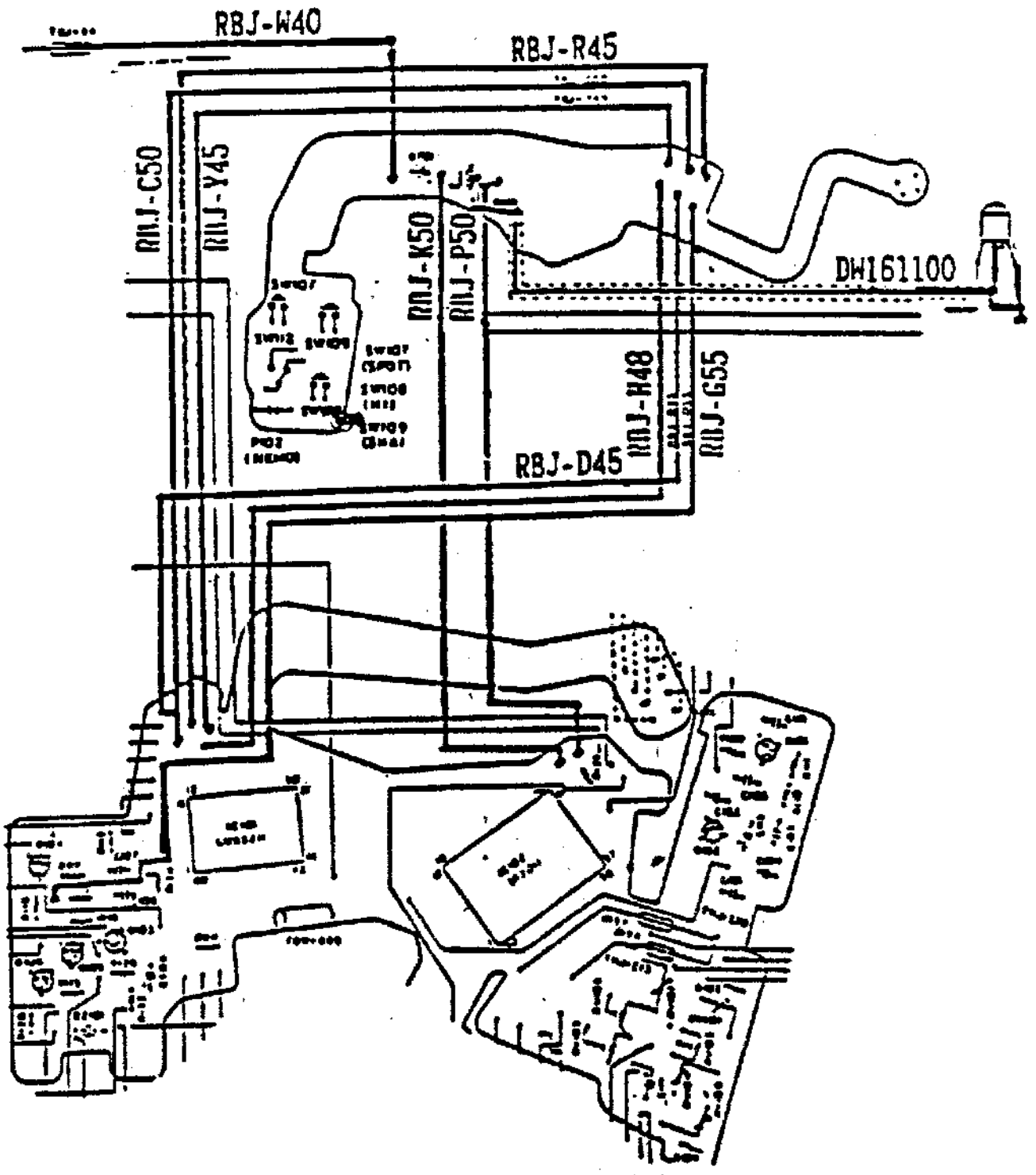
I. DETACHMENT OF TOP COVER ASS'Y ..... C- 1
II. REMOVAL OF TV CIRCUIT BOARD ..... C- 3
III. DISMOUNTING OF SHUTTER UNIT ..... C- 5
IV. DISASSEMBLY OF SHUTTER MECHANISM ..... C- 7
V. REMOVAL OF MAIN CIRCUIT BOARD ..... C- 8
VI. DETACHMENT OF SIDE PLATES L AND R C-10
VII. DISASSEMBLY OF FILM WIND UNIT C-11

I. DETACHMENT OF TOP COVER ASS'Y

	Main part	Part to be removed	Q'ty	Removable part	Remarks
1.	Lever	CE565000 Lever screw	1	Lever ZC454200 FW Lever dec. ring CE564700 Lever connector CE564900 B 1/16 (2)	
2.	R knob	CE565500 R Knob	1	R Lever ZJ178400 R Lever pin CA873000 R Lever spring CE566000 R Spring holder CE566100	
3.	SV dial	CE568300 Cover holder	1	ASA Cover plate CE568200 SV Dial ZC453700 SV Click CE568600 SV Spring CE568700	
4.	IS knob	CE563400 IS Screw	1	IS Knob CE563300	

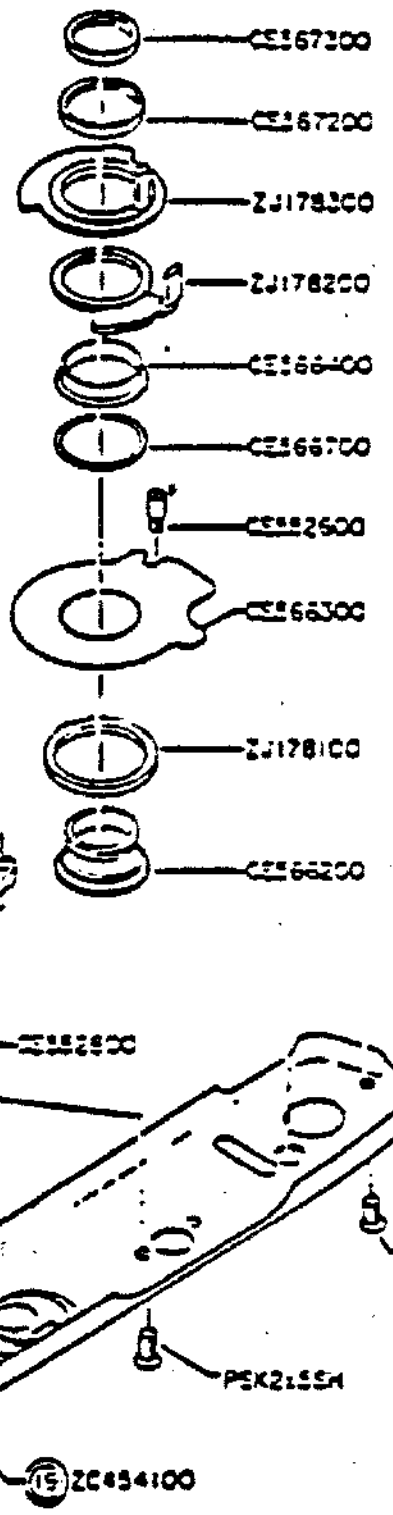
	Main part	Part to be removed	Q'ty	Removable part	Remarks
5.	Top cover ass'y	CE556900	4	Top cover ass'y	
		U Screw		ZC453300	
		RBJ-P50	1	RK Button	
		RBJ-K50	1	CE561200	
		DW161100	1	RK Spring	
		FP Shield 2	1	CE561300	
		RBJ-D45	1	P Rod	
		RBJ-C50	1	CE521500	
		RBJ-R45	1	Key spring	
		RBJ-Y45	1	CE557200	
		RBJ-H48	1		
		RBJ-G55	1		
		RBJ-W40	1		

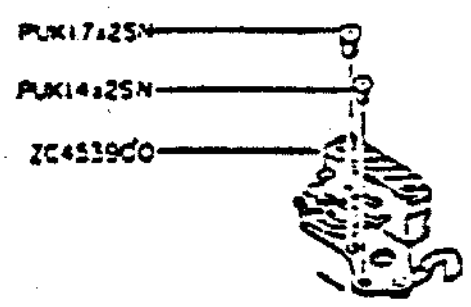




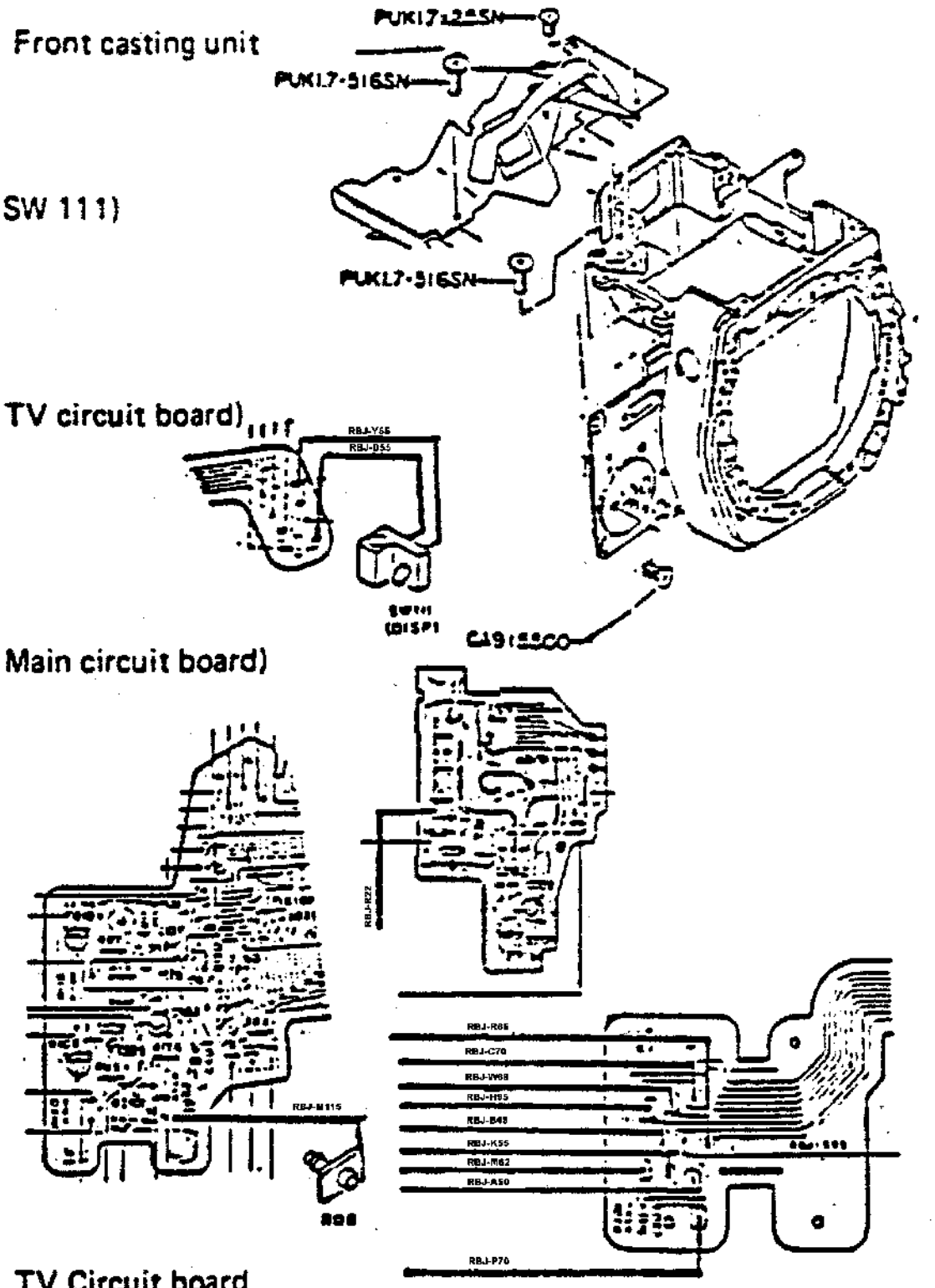
II. REMOVAL OF TV CIRCUIT BOARD

	Main part	Part to be removed	Q'ty	Removable part	Remarks
1.	SV circuit board	CE567300 SV Nut 2 ZJ178100 M Switch mecha CE566200 SV Collar	1 1 1	SV Circuit board CE566300	The SV circuit board is removed as a unit consisting of the SV collar and other six parts. (Do not disconnect the lead wires.)
2.	Bottom plate ass'y	PSK2x4SH PSK2x5SH	2 2	Bottom plate ass'y ZC454100 T Mount seal CE552800	
3.	SW plate	PUK1.7x2SN PUK1.4x2SN RAJ-R36 RBJ-Y168 RBJ-G130	1 1 1 1 1	SW Plate ZC453900	

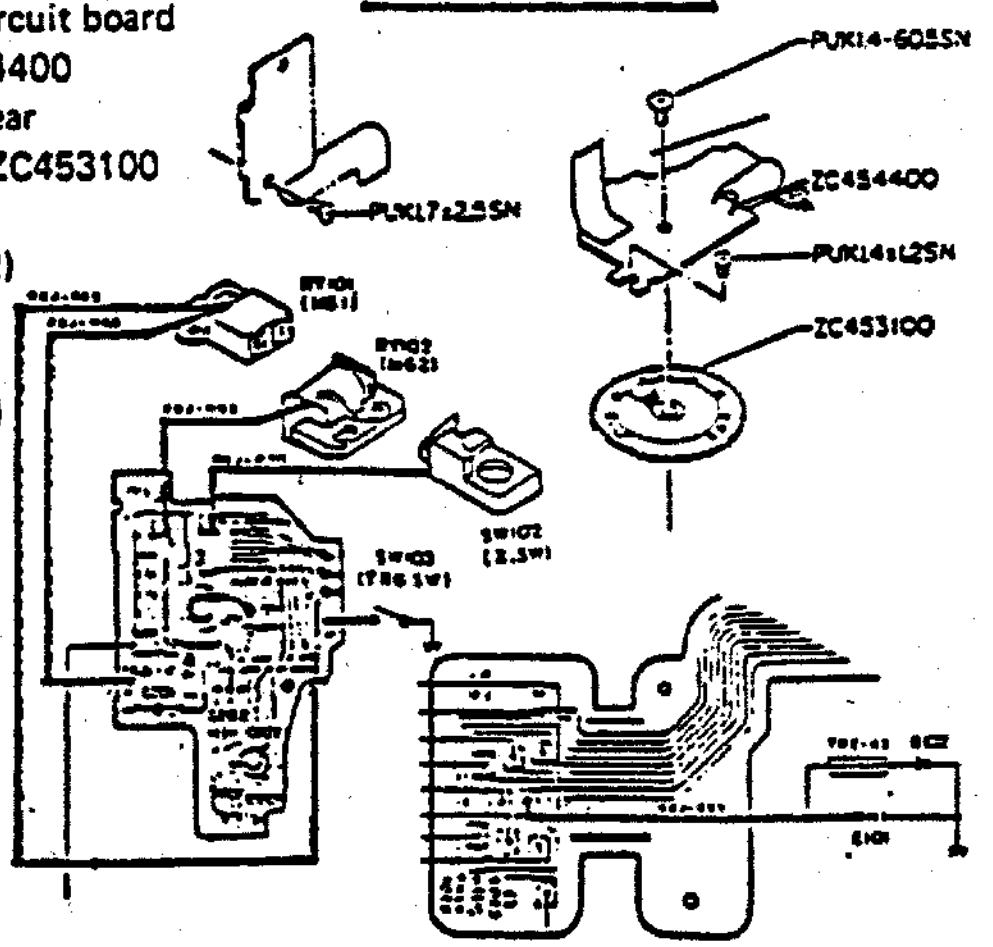




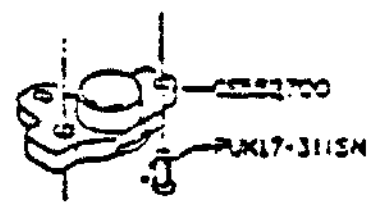
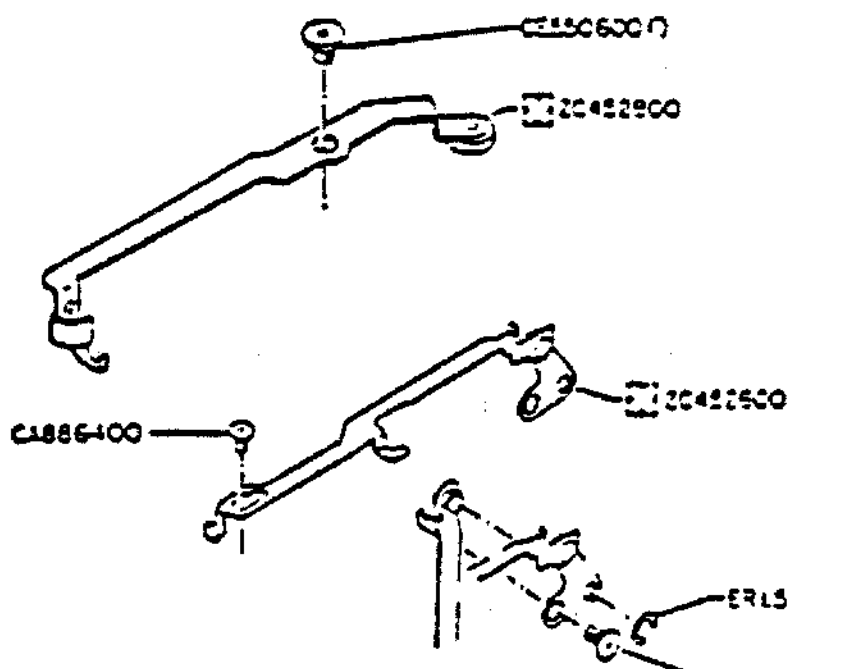
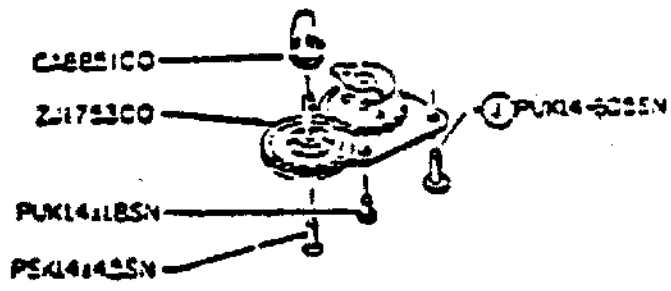
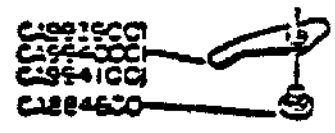
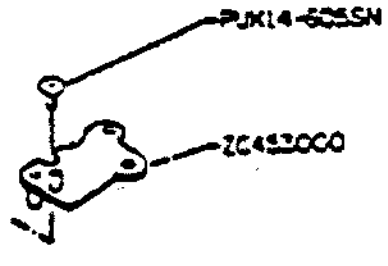
	Main part	Part to be removed	Q'ty	Removable part	Remarks
4.	Front casting unit	CA915500	5	Front casting unit	
		F Screw			
		PUK1.7–516SN	2		
		PUK1.7x2 5SN	1		
		RBJ-D55	1	SW 111)	
		RBJ-Y55	1		
		RBJ-P70	1		
		R8J-R65	1		
		RBJ-C70	1		
		RBJ-W68	1	TV circuit board)	
		RBJ-H95	1		
		RBJ-B48	1		
		RBJ-M62	1		
		RBJ-K55	1		
		RBJ-A50	1		
		RBJ-R22	1	Main circuit board)	
		RBJ-M115	1		



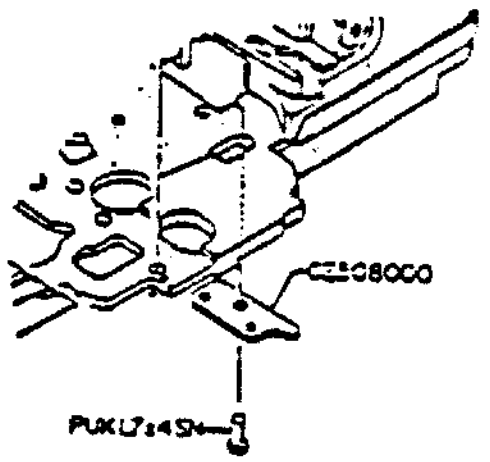
5.	TV circuit board	PUK1.4x2.5SN	1	TV Circuit board
		PUK1.4–605SN	1	ZC454400
		PUK1.4x1.2SN	1	TV Gear
		RBJ-B95	1	DC) ZC453100
		RBJ-H95	1	MG2)
		RBJ-P70	1	SW102)
		RBJ-W68	1	MG1)
		RBJ-R65	1	
		TRG, SW	1	Solder)



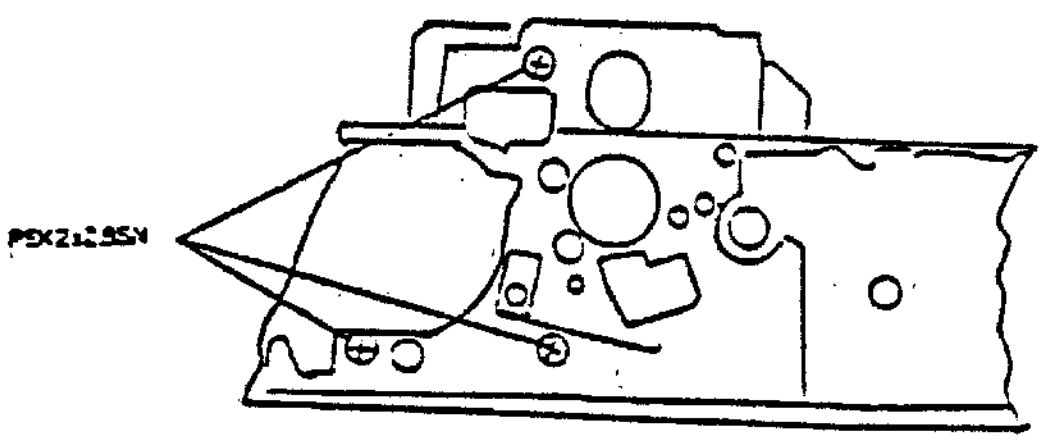
III. DISMOUNTING OF SHUTTER UNIT

	Main part	Part to be removed	Q'ty	Removable part	Remarks
1.	Tripod mount plate	PUK1.7x311	2	Tripod mount plate CE552700	
2.	KM lever	CE550600 M Lever shaft 2	1	KM Lever ZC452800	The M lever shaft 2 has left-hand thread. 
3.	KL plate	CA886400 KL Shaft CA907000 C Screw ER1.5 E Washer	1 1 1	KL Plate ZC452600	
4.	No. 4 base plate	PUK1.4–605SN PUK1.4x1.8SN PSK1.4x4.5SN	1 1 1	No. 4 base plate ZJ175300 No. 3 Gear spring CA885100	
5.	Spring lever	CA884600 Spring shaft 1	1	S Lever CA993900	
6.	TR circuit board	PUK1.4–605SN	1	TR Circuit board ZC453000	

	Main part	Part to be removed	Q'ty	Removable part	Remarks
7.	S plate	PUK1.4x4SN	1	S Plate CE508000	

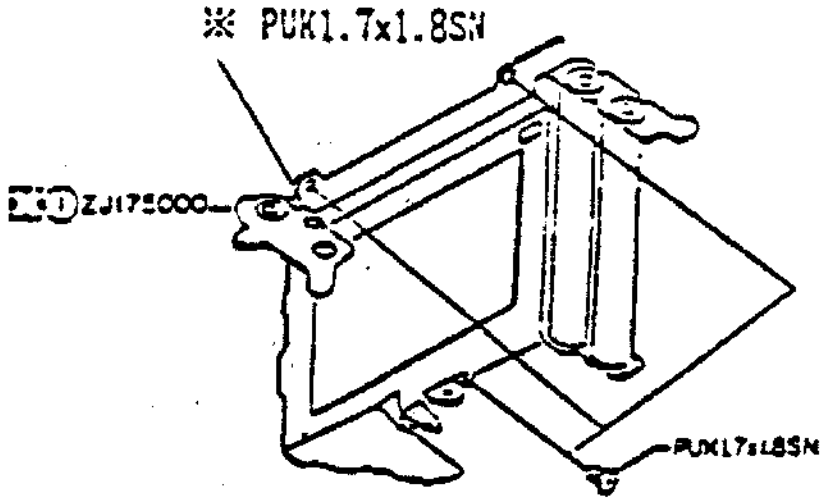


8-1	Shutter unit (lower part)	PSK2x2.8SN	3		



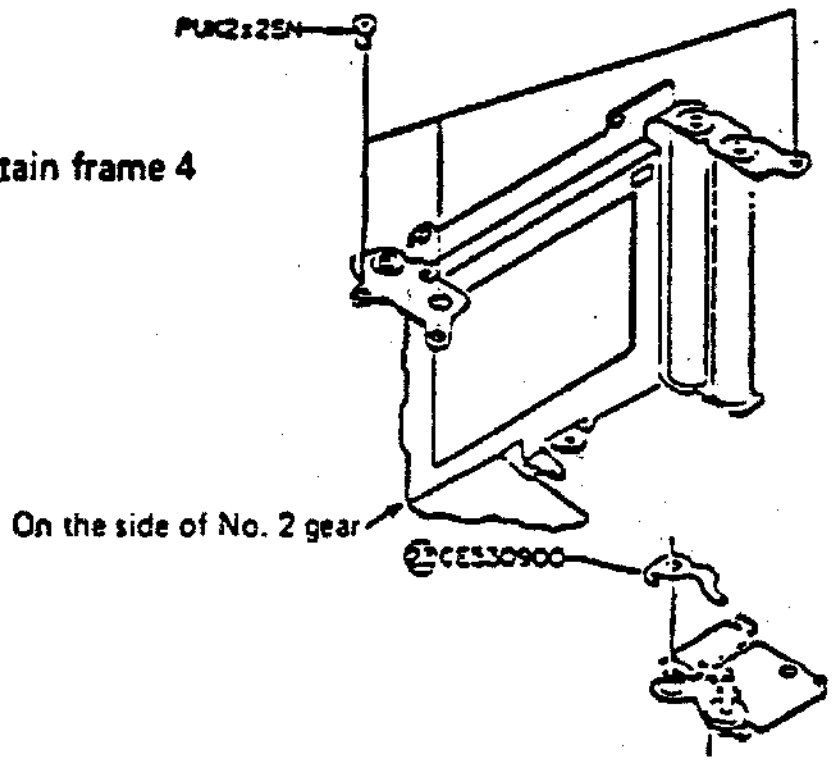
8-2	Shutter unit (mask)	PUK1.7x1.8SN	3		

*Tentatively tighten Screw PUK1.7x1.8SN to the U Plate R ZJ175000 to prevent it from separating from SC Frame ZJ175500 of the S body

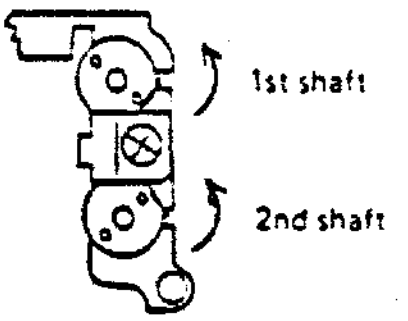
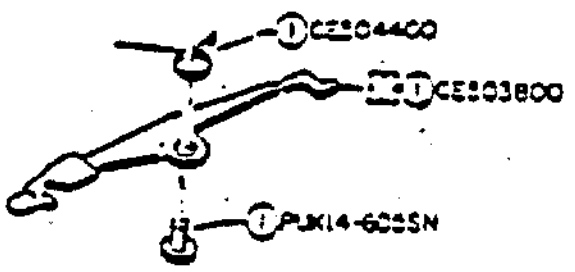
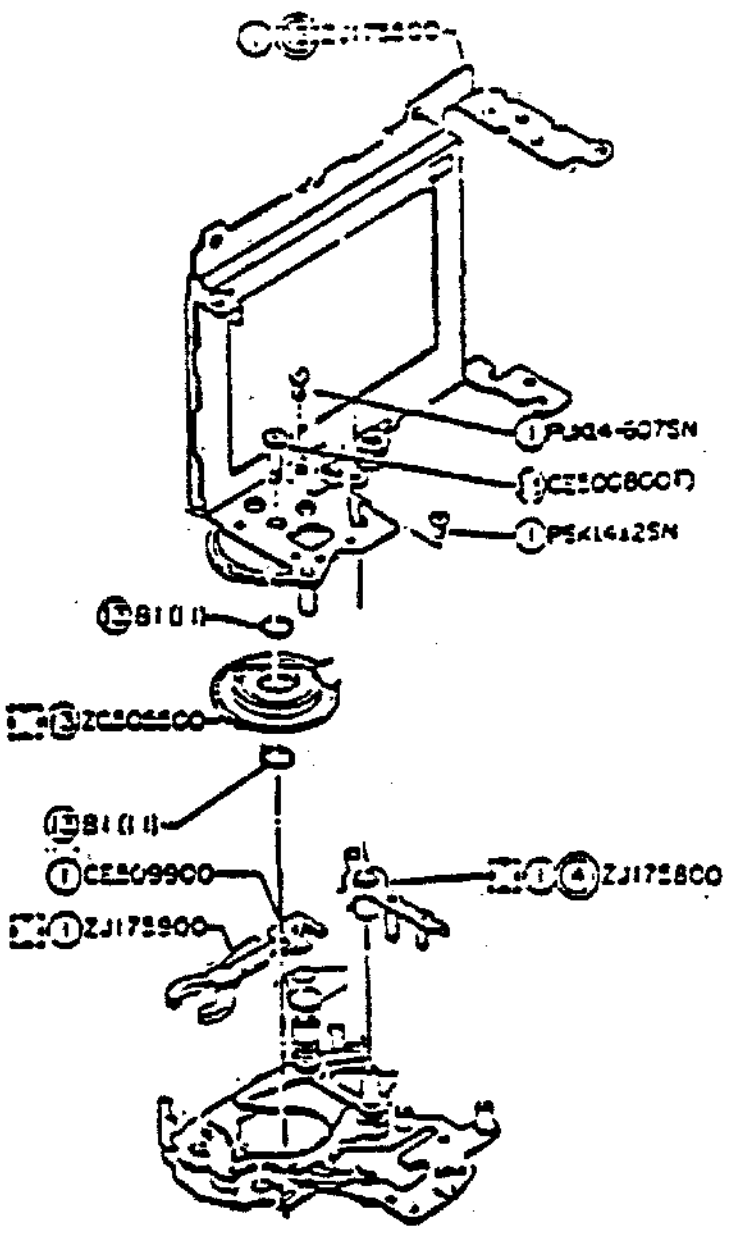


8-3	Shutter unit (upper part)	PUK2x2SN	3	Shutter curtain frame 4 ZC451000	

*While pushing up the shutter unit on the side of No. 2 Gear ZJ176000, remove the lower part of the curtain cylinder from the shutter curtain frame and then separate the shutter unit by raising it to the top of the shutter curtain frame while swinging leftward, rightward, back and forth.



IV. DISASSEMBLY OF SHUTTER MECHANISM

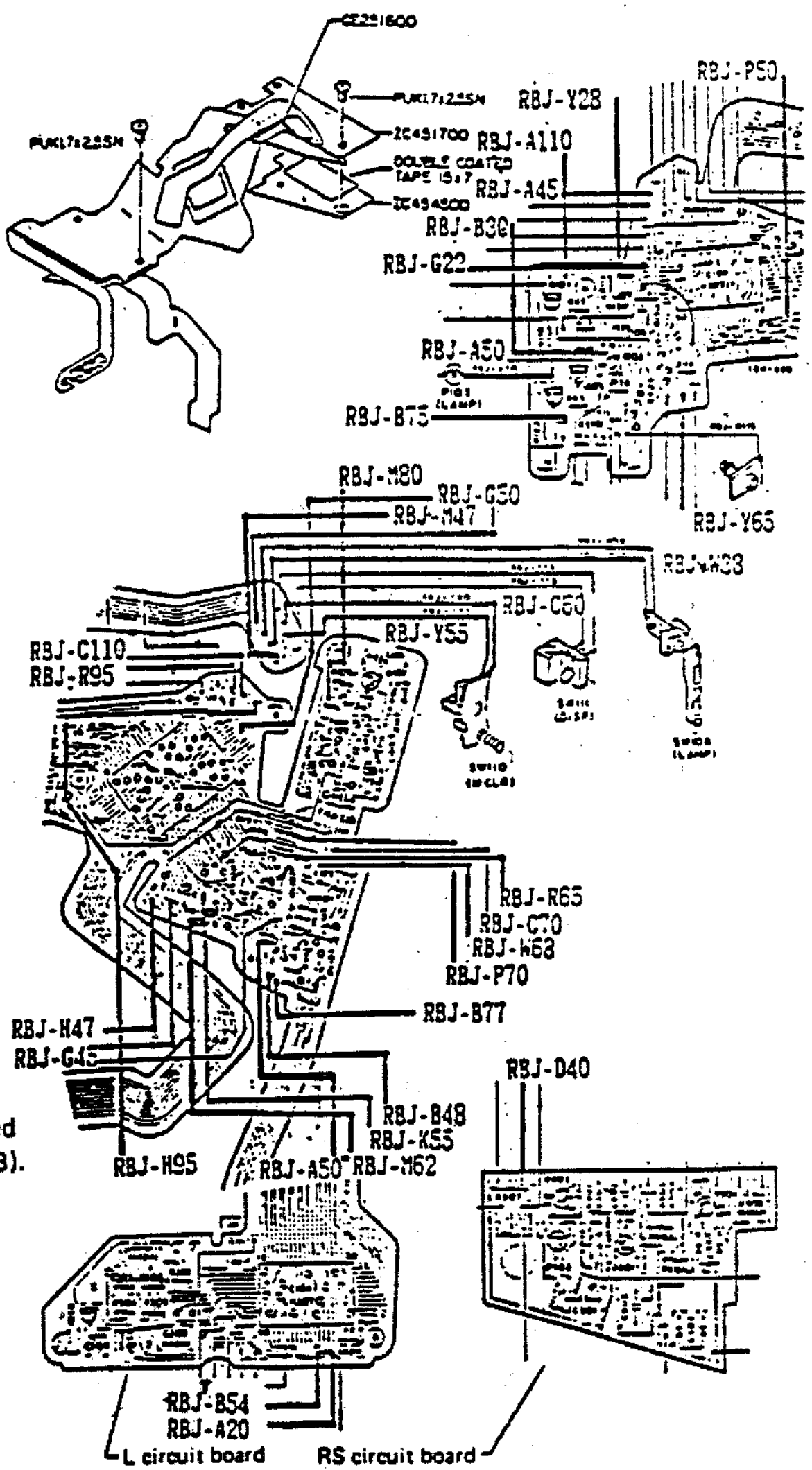
	Main part	Part to be removed	Q'ty	Removable part	Remarks
1.	Set shutter blind torque at 0. The 1st shutter blind rotates the 1st shaft about 5.5 turns counterclockwise, whereas the 2nd shutter blind rotates the 2nd shaft about 4 turns counterclockwise.				
2.	M lever 2	PUK1.4–605SN	1	M Lever 2 CE503800 M Lever spring CE504400	
3.	SC frame 2	PUK1.4–607SN PUK1.4x2SN	1 1	SC Frame 2 ZJ175500 R Claw ZJ175800 B Lever ZJ175900 BB Lever spring 2 CE509900	

•Note that 22 balls B_1 spring out since Gear A ZC505500 is disengaged upon removing Gear Screw CE500800.

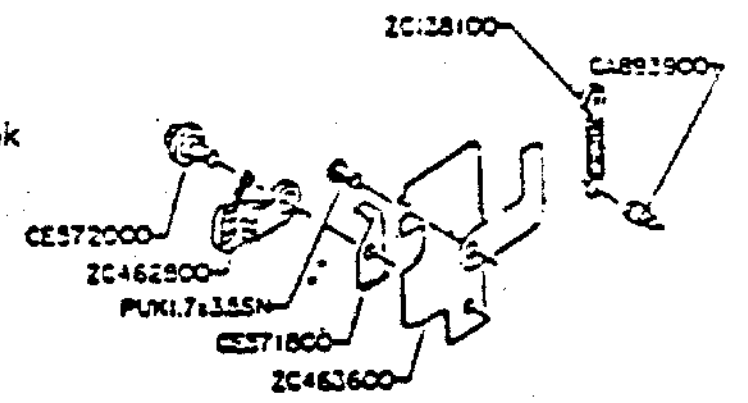
V. REMOVAL OF MAIN CIRCUIT BOARD

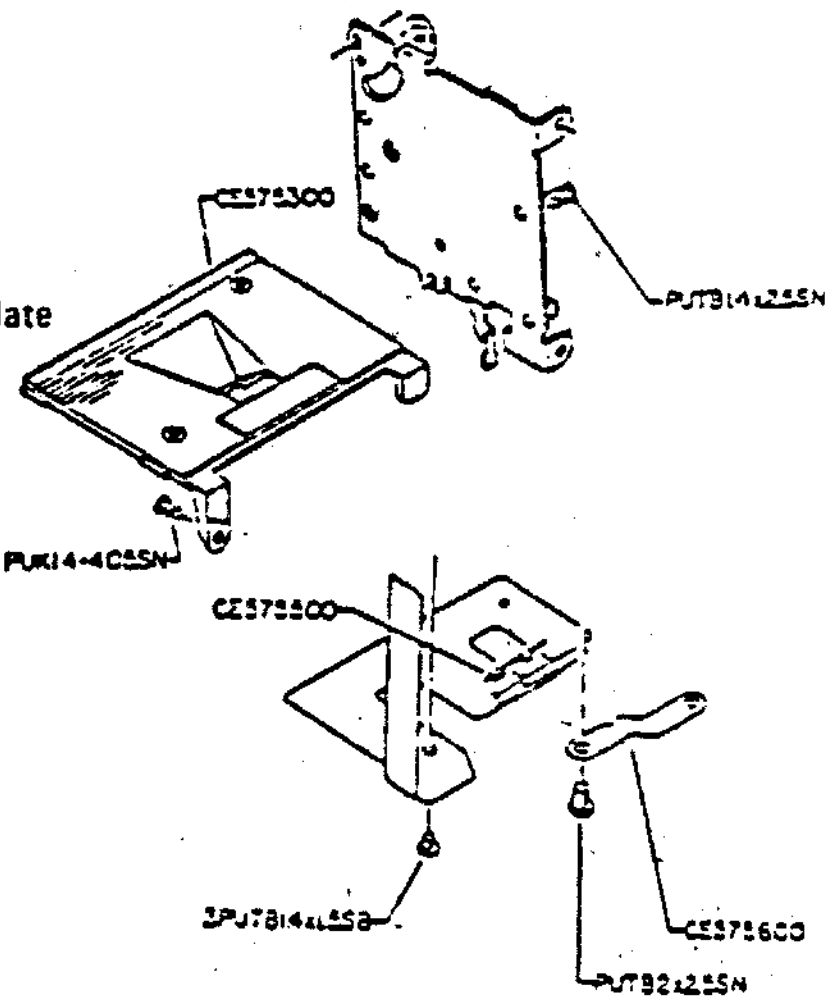
Main part	Part to be removed	Q'ty	Removable part	Remarks
Main circuit board	PUK1.7x2.5SN			RS Circuit board ZC454500 and CV Circuit board CE566300 are removed together with the main circuit board.
	RBJ-Y28			
	RBJ-A45			
	RBJ-B30			
	RBJ-P50			
Upper left side	RBJ-G22			
	RBJ-A50			
	RBJ-B75			
	RBJ-Y65			
	RBJ-A110			
	RBJ-H47			
	RBJ-G45			
	RBJ-K55			
	RBJ-M62			
	RBJ-A50			
	RBJ-B48			
	RBJ-B77			
	RBJ-W68			
	RBJ-R65			
Upper right side	RBJ-C70			
	RBJ-P70			
	RBJ-M80			
	RBJ-G50			
	RBJ-H95			
	RBJ-C60			
	RBJ-M47			
	RBJ-W38			
	RBJ-Y55			
	RBJ-C110			
	RBJ-R95			
L circuit board	RBJ-B54			
	RBJ-A20			
RS circuit board	RBJ-D40			
	RBJ-W115			

*Wiring is partially different on the circuit boards manufactured before November, 1983 (TNCB).



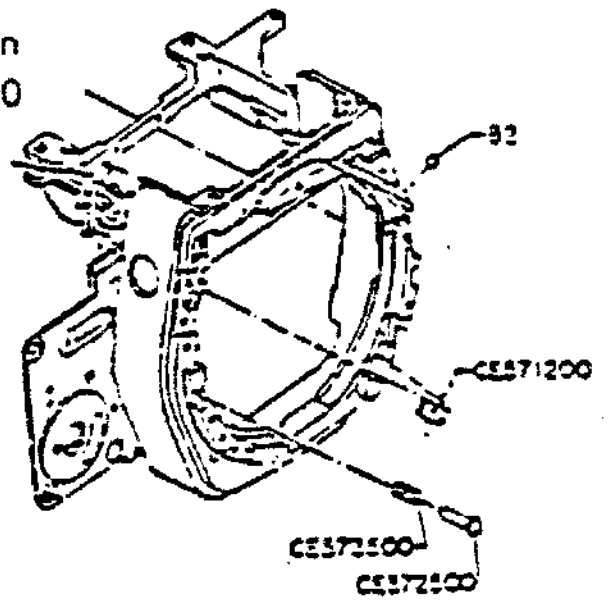
	Main part	Part to be removed	Q'ty	Removable part	Remarks
2.	SE circuit board	PUK1.7x3.5SN	1	SE Holder	
		CE572000	1	ZC462800	
		SE Screw		SE Spring hook	
		CA893900	1	CE571800	
		8 Spring shaft			
3.	L covering plate	PUTB1.4x2.5SN	1	L Stopper	
		PUK1.4—405SN	1	CE575600	
		3PUTB1.4x1.5SB	2	L Covering plate	
		PUTB2x2.5SN	2	CE575300	



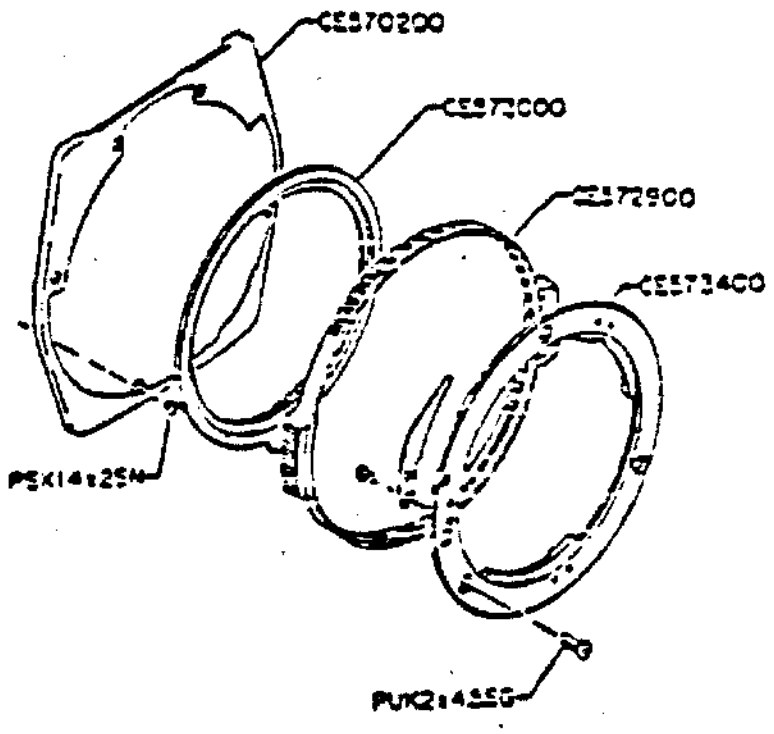


VI. DETACHMENT OF SIDE PLATE L AND R

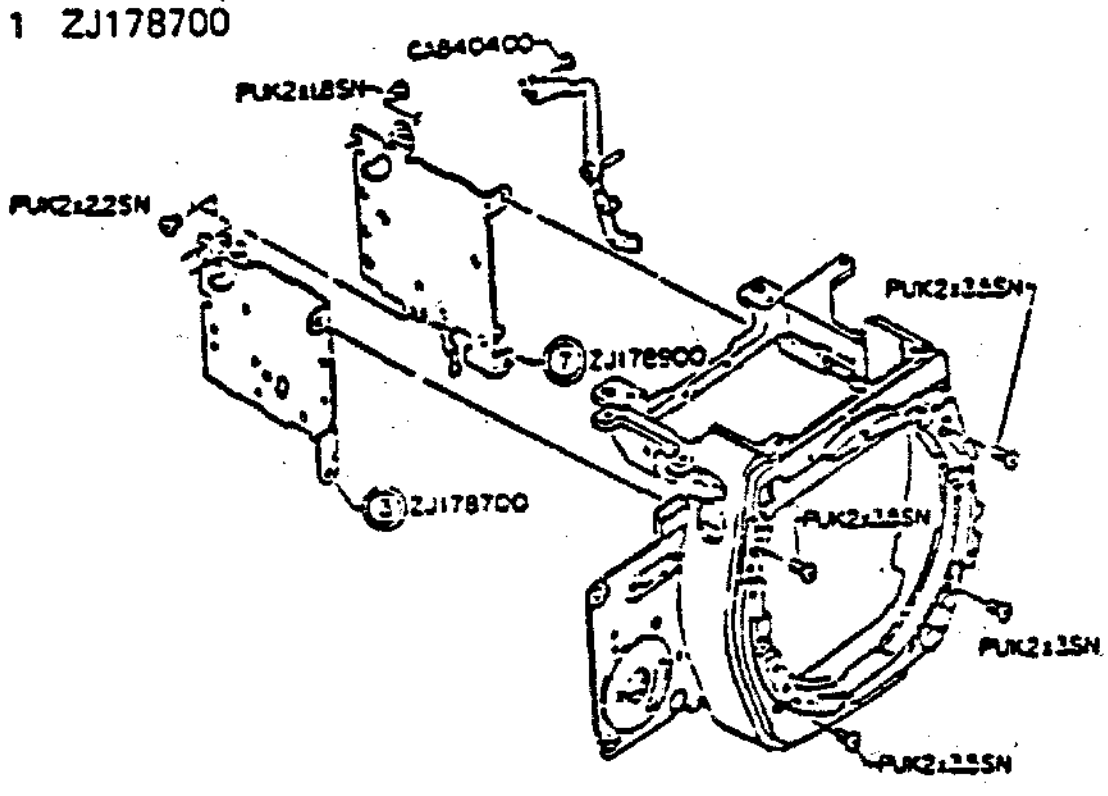
Main part	Part to be removed	Q'ty	Removable part		Remarks
B mount	PUK2x4.5SG	3	B Mount	BL Button	
	PSK1.4x2SN	5	CE573400	CE571200	
			S Dial		
			CE572900		
			Dial gear		
			CE573000		
			Front cover		
			CE570200		
			L Pin		
			CE572500		
			L Pin sprmg		
			CE573500		
			B2		



2. Side plate L	PUK2x3.5SN	1	Side plate L	
	PUK2x3SN	1	ZJ178900	
	PUK2x1.8SN	1		
	CA840400	1		
	M Lever screw			

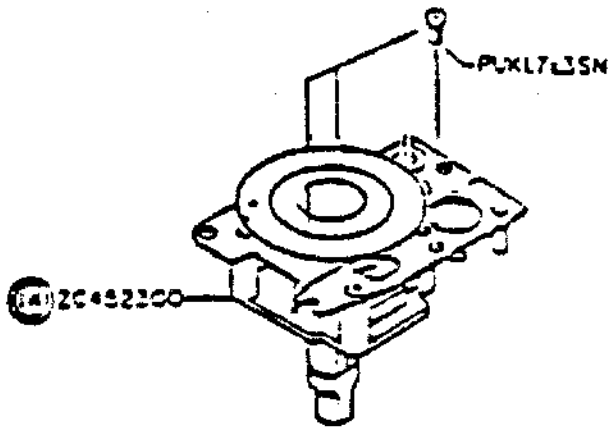


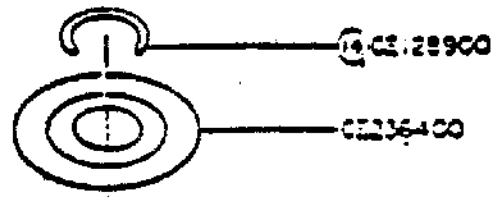
3. Side plate R	PUK2x3.5SN	2	Side plate R	
	PUK2x2.2SN	1	ZJ178700	

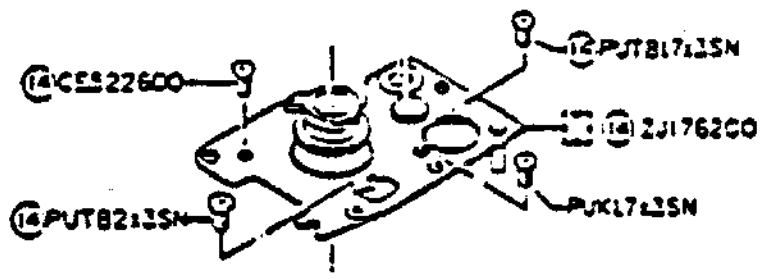


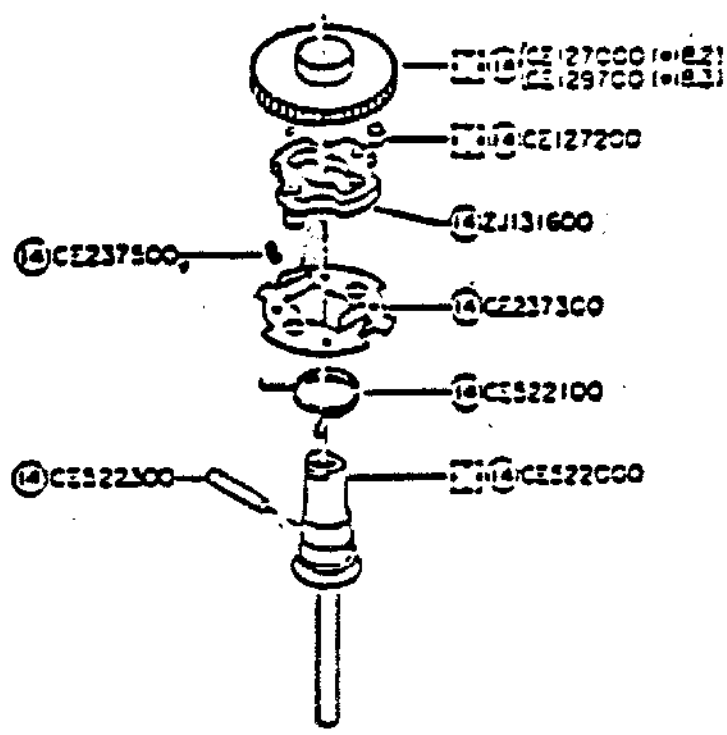
VII. DISASSEMBLY OF FILM WIND UNIT

	Main part	Part to be removed	Q'ty	Removable part	Remarks
1.	Film wind unit	PUK1.7x3SN	3	FM Mecha ass'y ZC452300	The film wind unit is removed as a whole the camera body.
2.	FC plate	CE128900 FC Stopper	1	FC plate CE236400	
3.	U base plate	CE522600 W Screw	1	U Base plate ZJ176200	Release Lock lever CE520700 and raise the U base plate.
		PUTB2x3SN	1		
		PUTB1.7x3SN	1		
4.	P winding shaft	CE522100 Returning spring	1	FW Claw ZJ131600	
		CE237300 Spring 2	1	Roller CE127200 R Spring A CE237500 FW Gear 1 CE127000 P·W Pin CE522300	









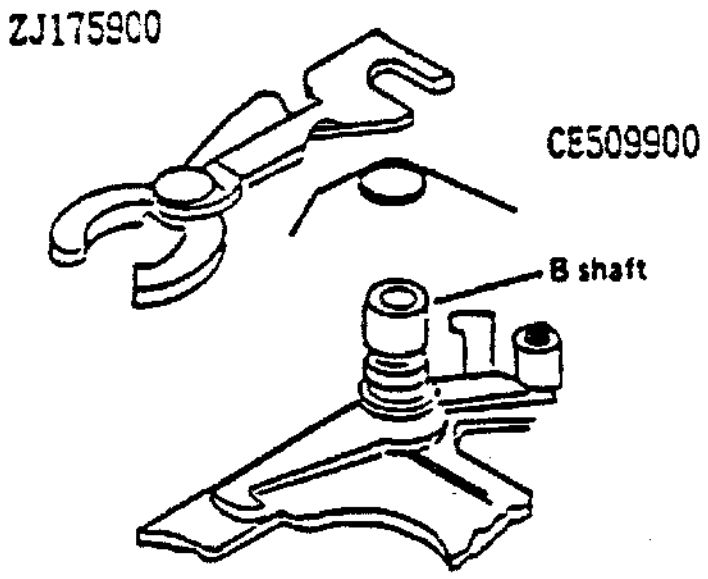
D. REASSEMBLING AND ADJUSTING PROCEDURES

CONTENTS

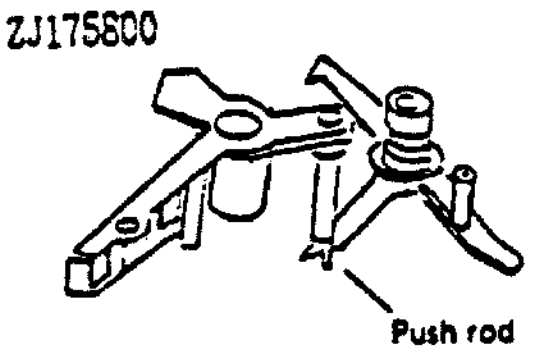
I. REASSEMBLY AND ADJUSTMENT OF SHUTTER UNIT ..... D- 1
II. REASSEMBLY AND ADJUSTMENT OF FILM WIND UNIT ..... D- 5
III. REASSEMBLY AND ADJUSTMENT OF FRONT CASTING UNIT ..... D- 7
1. Check and Adjustment of Side Plate R ..... D- 7
2. Check and Adjustment of Side Plate L ..... D- 7
3. Adjustment of Viewfinder Focus Point D-10
4. Reassembly and Adjustment of Photosensor Element D-11
IV. FORMING OF LEAD WIRES AND CIRCUIT BOARDS D-12
1. Forming of Circuit Boards D-12
2. Reassembly of Circuit Boards D-14
3. Forming of Lead Wires D-15
V. REASSEMBLY OF FRONT CASTING UNIT D-19
VI. CHECK AND ADJUSTMENT OF EXPOSURE CONTROL CIRCUIT AND INDICATION CIRCUIT D-20
1. Adjustment of Main Circuit Board D-20
2. TV Adjustment (Manual time) D-24
3. EE Adjustment (Direct auto mode) D-25
4. Adjustment of Indication (BV) D-26
5. Check of Indicator Lamps within Viewfinder D-27
VII. REASSEMBLY AND ADJUSTMENT OF INDICATOR ILLUMINATOR D-28
1. Reassembly of PL Base Unit D-28
2. Reassembly and Adjustment of K Prism D-29
3. Reassembly and Adjustment of L Circuit Board, LCD and K Prism D-30
VIII. TIMING ADJUSTMENT OF SW BASE PLATE D-31
IX. CHECK AND ADJUSTMENT OF SPOT CHARACTERISTIC (POSITION OF SUB MIRROR) D-33

I. REASSEMBLY AND ADJUSTMENT OF SHUTTER UNIT

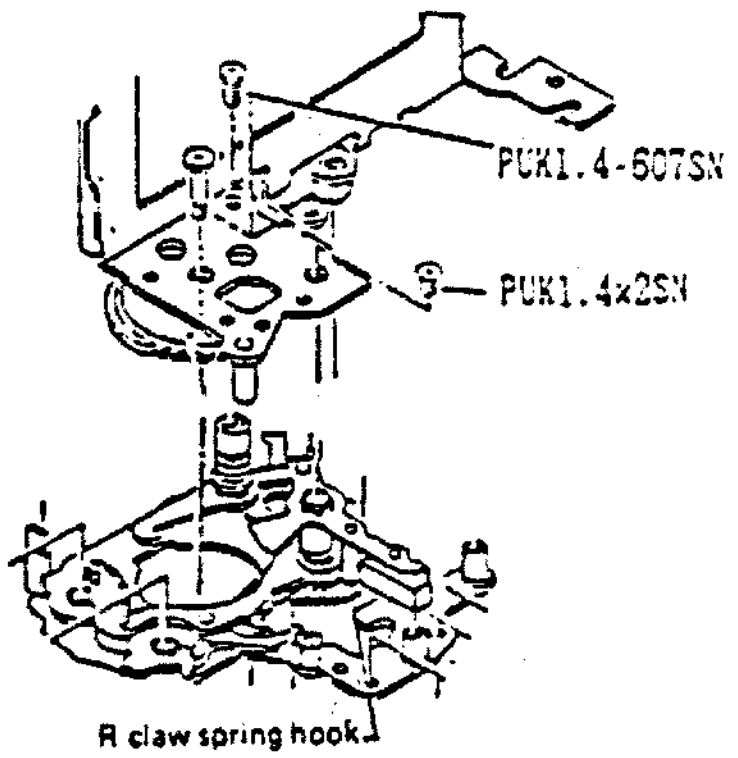
1. Reassembly of B Brake Lever
   - Fit B Lever spring CE509900 over the B shaft with the bent part of the spring set on the side of Gear AZC505500.
   - Fit the U-shaped part of B Brake lever ZJ-175900 into the second highest groove of the B shaft and engage the B lever spring.



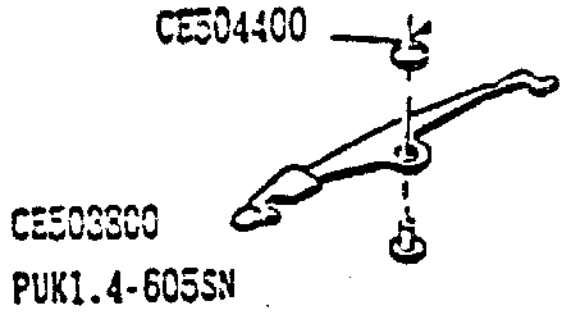
2. Reassembly of R Claw
   - Fit R Claw ZJ175800 into the R shaft. (The push rod of the R claw should be located as shown on the right side.)



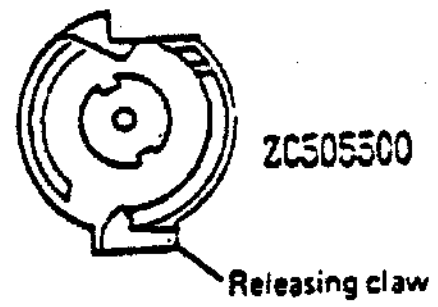
3. Bring Shutter frame ZJ175500 into contact with Shutter base plate ZJ175200.
   - Set the shutter frame while taking care not to catch the releasing claw, Hook lever ZJ175400, etc.
   - Tighten Screws PUK1.4–607SN and PSK1.4x 2SN.
   - Engage R Spring XE505000 with the R claw spring hook (groove).

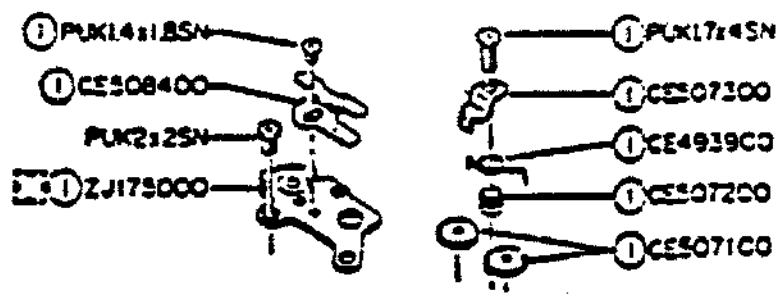


4. Reassembly of M Lever 2 CE503800
   - Fit M Lever spring CE504400 over the shaft for M lever 2.
   - Fit M Lever 2 CE503800 over the shaft and tighten Screw PUK1.4–605SN.
   - Engage the M lever spring.

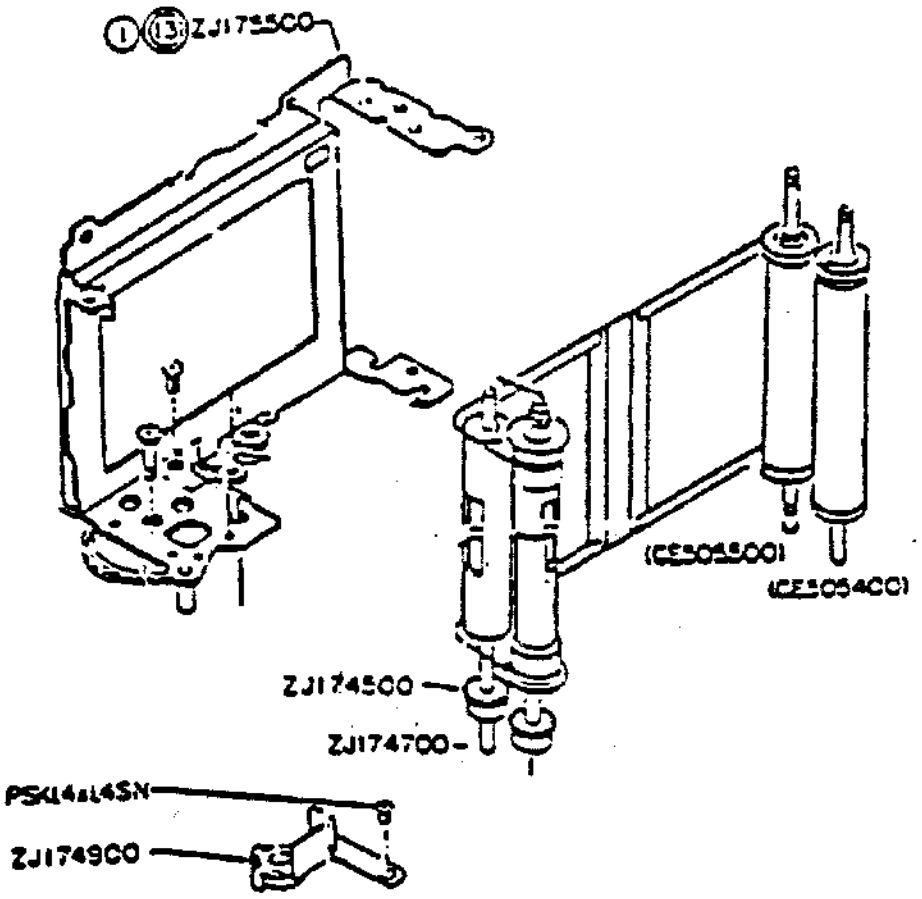


5. Reassembly of B Stopper
   - Turn Gear A ZC505500 until it is engaged with the releasing claw.
   - Turn Gear B CE500400 counterclockwise until it is stopped.
   - Set B Stopper CE 508300 in position and fix it with Screw PSK1.4x1.4SN.

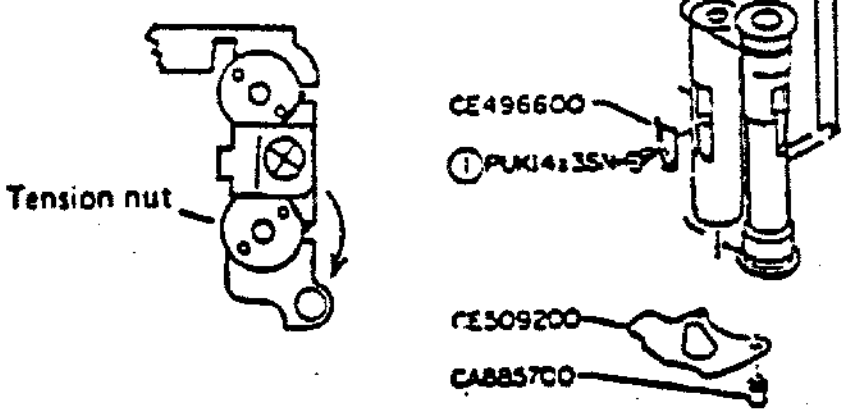


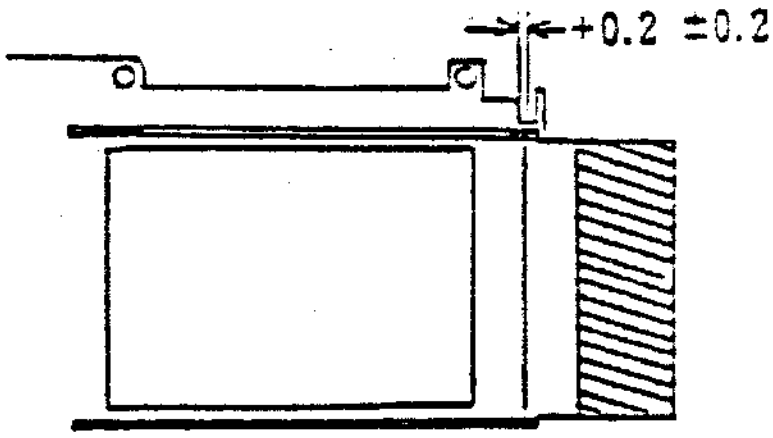


6. Reassembly of 1st and 2nd Shutter Blinds
   - Insert Blind shaft C CE505400 and Blind shaft D CE505500 into Shutter frame 2 ZJ175500.
   - Tighten Tension nut CE507100.
   - Fix TN Shaft CE507200, T Stopper CE493900 and TN Lock CE507300 by tightening Screws PUK1.7x4SN.
   - Insert Tube A ZJ174700 and Tube shaft B ZJ-174500 into the shutter frame 2.
   - Tentatively fix U plate R ZJ175000.
   - Fix I Plate R ZJ174900 with Screw PSK1.4x 4SN.

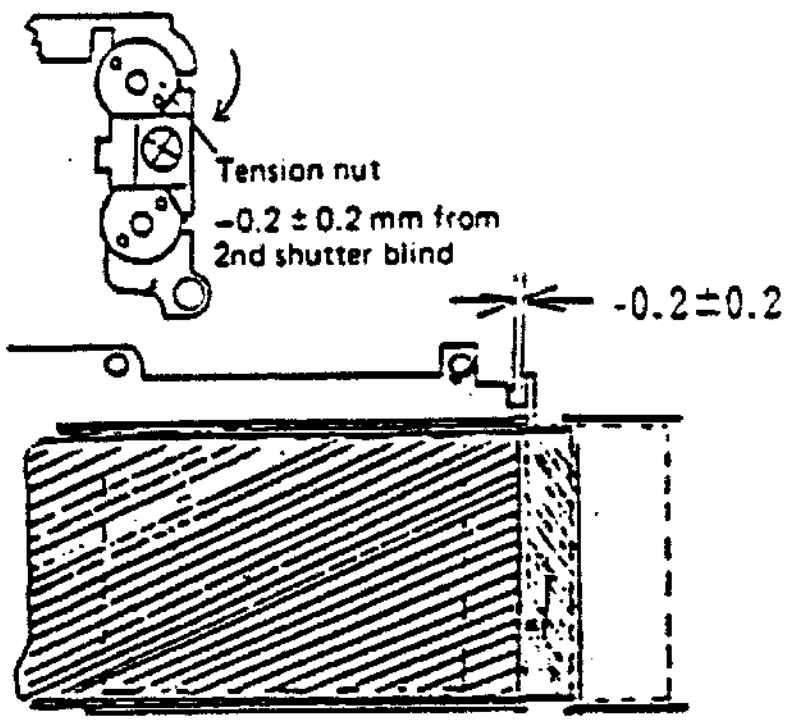


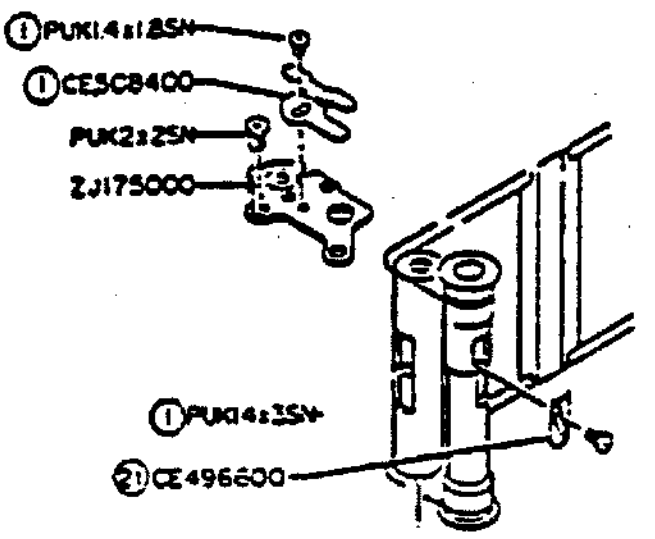
7. Positioning of 2nd Shutter Blind
   - Apply torque to the 2nd shutter blind (rotate the tension nut about 4 turns clockwise).
   - Remove the tube shaft B from gear B. Wind the 2nd shutter blind until its metal fitting is located as shown on the right side. Perform fine adjustment by moving Positioning plate CE496600.
   - Fix L Plate CE509200 with B Plate shaft CA-885700.





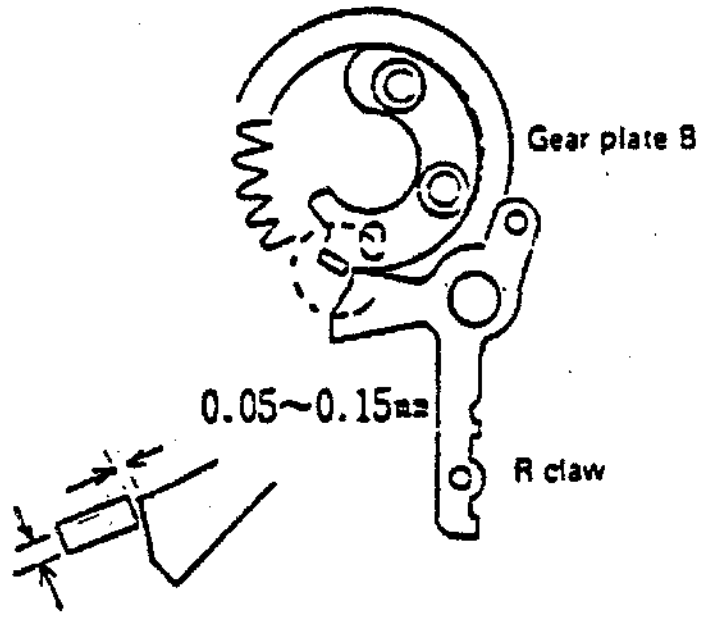
8. Positioning of 1st Shutter Blind
   - Apply torque to the 1st shutter blind (rotate the tension nut about 5.5 turns clockwise).
   - Remove Tube A ZJ174700 from gear A. Wind the 1st shutter blind until its metal fitting is located as shown below. Perform fine adjustment by moving the positioning plate.
   - Fix the U stopper with Screw PUK1.4x1.8SN.





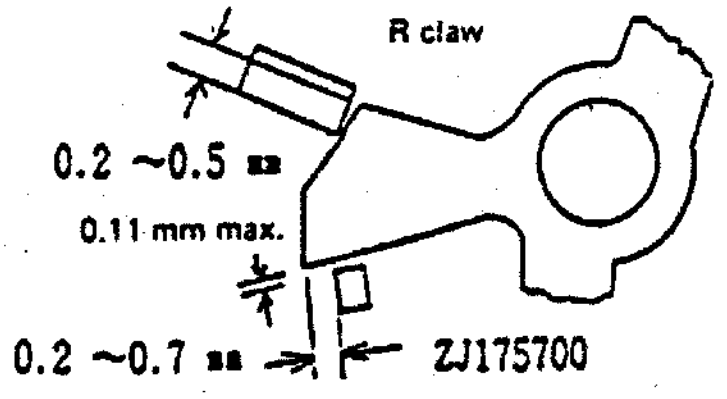
9. Adjustment of Gap between R Claw and Gear Plate B

- Charge the shutter. (The releasing claw must be engaged with the second stage of the gear A.)
- Engaging depth of R claw
  Bring M Lever spring CE504600 into contact with the magnet and adjust engaging depth of the R claw to 0.3 ~ 0.5 mm by changing position of MG Plate ZJ175600.
- Gap of R claw
  Adjust the gap to 0.05 ~ 0.15 mm by changing position of the gear plate B assembled with the gear B.
- The pressure plate must be brought into close contact with the magnet under force applied through the releasing claw by the push rod.



10. Adjustment of Gap between Valve Lever and R Claw

- Charge the shutter by releasing BU Lever ZJ-175700.
- The gap between the BU lever and R claw must be 0.1 mm max. The lever must spring into the R claw in this condition.
- When the shutter is kept open, engagement depth between the BU lever and R claw must be 0.2 ~ 0.5 mm.
- If not, adjust engagement depth by bending the BU lever.

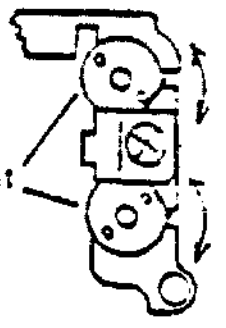


11. Adjustment of Shutter Blind Speed

- Adjust speed of the 1st and 2nd shutter blinds by turninb the tension nut.

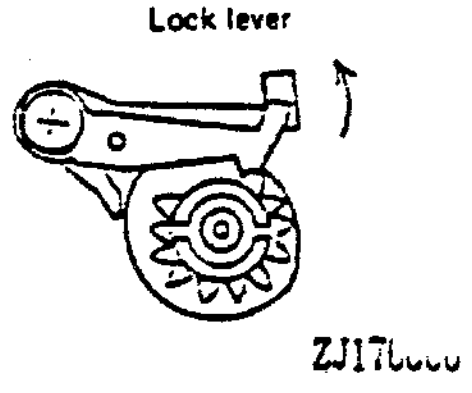
Standard: $10.9^{+0.1}_{-0.15}$ ms

Reassembly of shutter unit



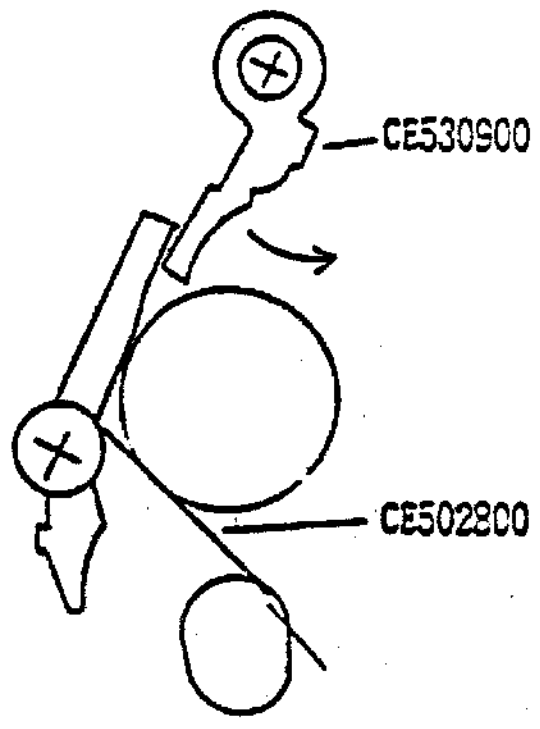
12. Positioning of No. 2 Gear

- Release the lock lever and rotate No. 2 Gear ZJ176000 1/4 turn.

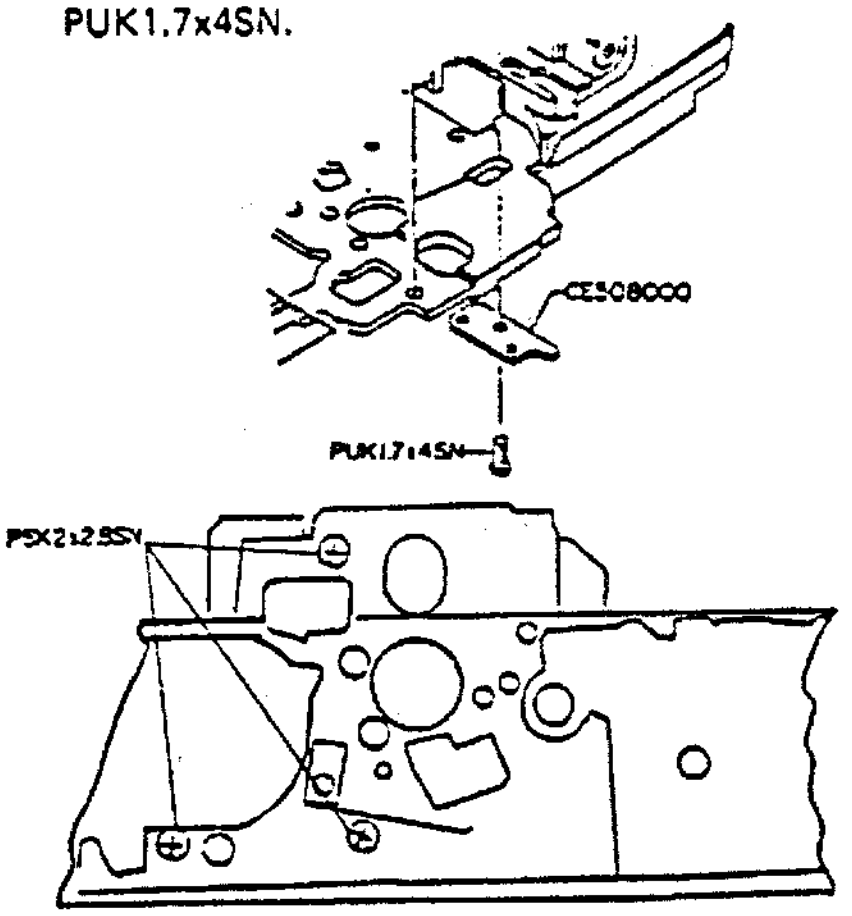


13. Setting of Shutter Unit

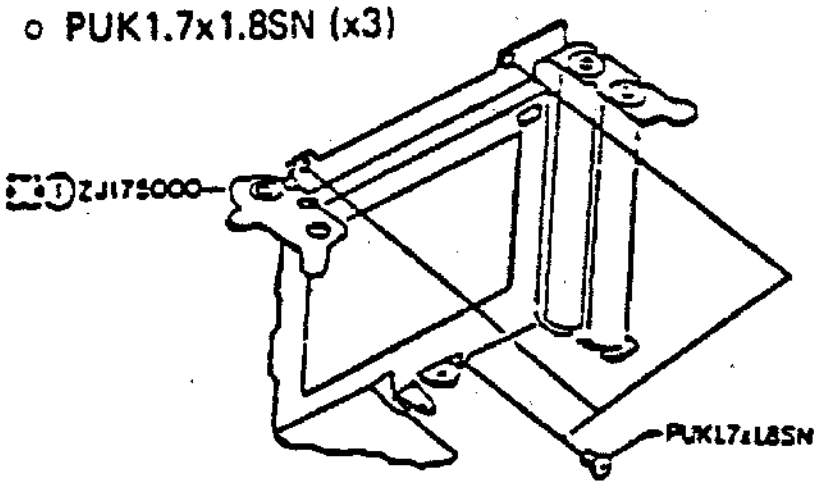
- Set the shutter unit into the camera body from above.
- Allow SL Lever CE530900 toward MG1 and reassemble the shutter unit with the camera body.
- Engage Reset spring CE502800 with the camera body.



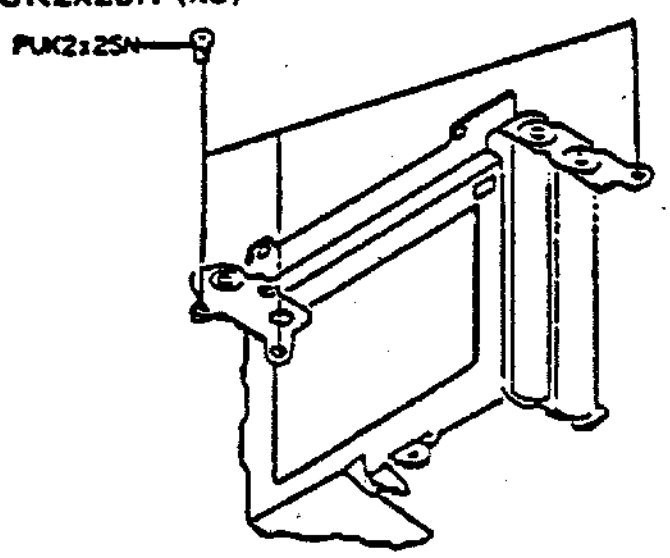
14. Tighten the three screws on the bottom of the camera body:
- PSK2x2.8SN (x3)
- Reassemble S Plate CE508000 with two Screws PUK1.7x4SN.



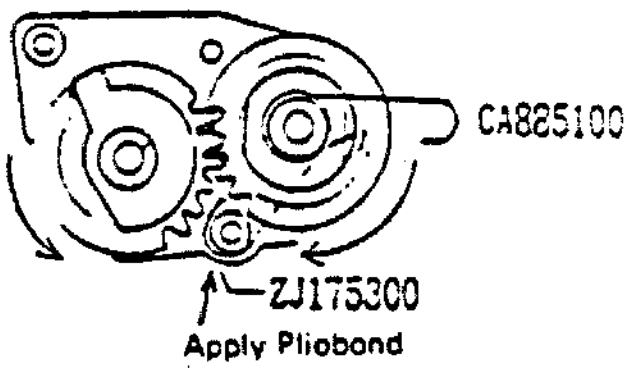
15. Tighten the three screws on the mask of the camera body:
- PUK1.7x1.8SN (x3)



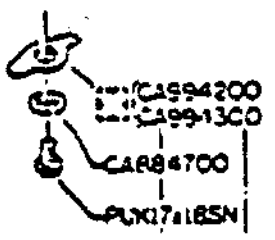
16. Tighten the two screws on the stop of the camera body:
- PUK2x2SN (x3)



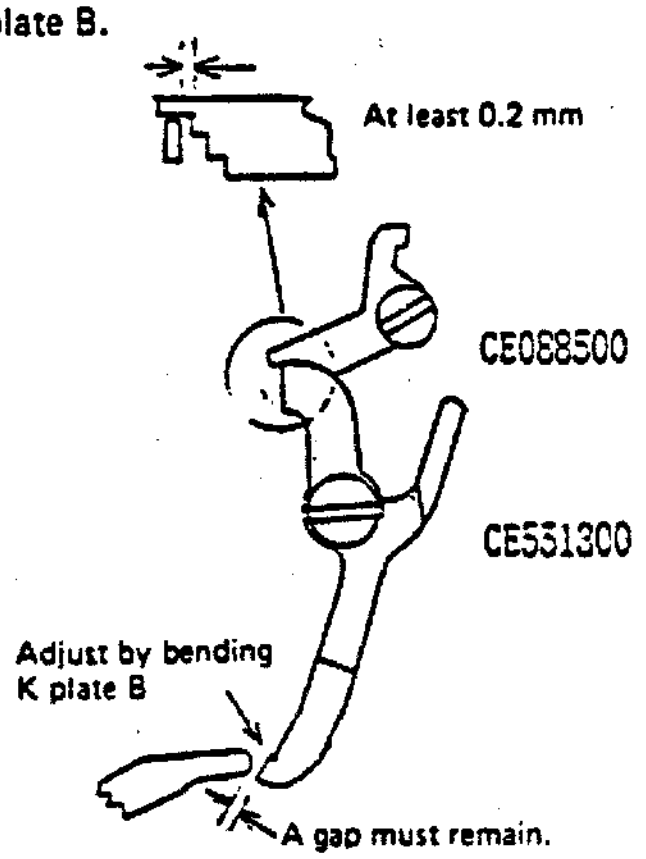
17. Reassembly No. 4 base plate.
- Engage No. 3 Gear spring CA885100 with the No. 4 base plate.
- Reassemble the No. 4 base plate with the shutter unit.



18. Reassemble S lever 2.
- Mount S Lever 2 CA994200 on KS Holder CA884700 and tighten Screw PUK1.7x1.8SN.



19. Gap of K Plate B
- In film winding, K Plate B CE551300 must be placed over the upper stage of K Plate A CE-088500 with a gap of at least 0.2 mm.
- When the gap is narrower than 0.2 mm, adjust it by bending the J plate B. (The K plate A must not penetrate into the K plate B.)
- After completing film winding, a gap must remain between the K plate B and releasing claw.
- If no gap remains, form a gap by bending the K plate B.



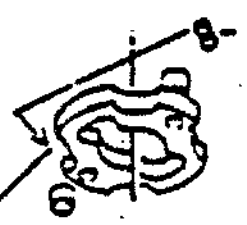
II. REASSEMBLY AND ADJUSTMENT OF FILM WIND UNIT

1. Reassembly of Film Wind Unit

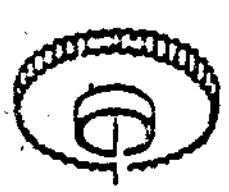
1) Reassembly of FW Gear 1 CE127000 and roller

- Set the FW gear 1 inside out and reassemble 1 through 4 in this sequence:
  1. FW Claw ZJ131600
  2. Roller CE127200
  3. R Spring A CE237500
  4. Spring 2 CE237300

CE237300



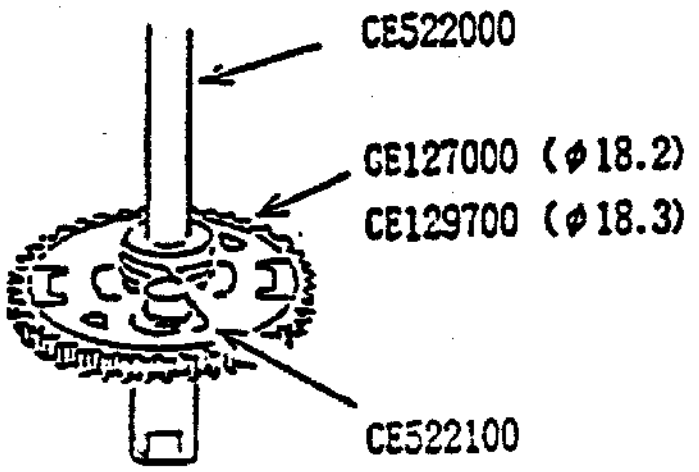
CE237500
CE127200
ZJ131600



CE127000 (φ18.2)
CE129700 (φ18.3)

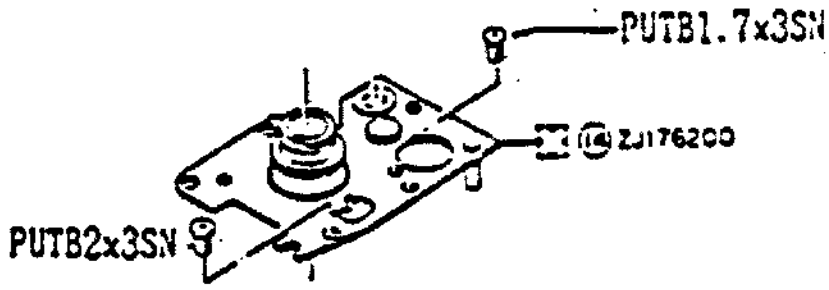
2) Reassembly of FW shaft

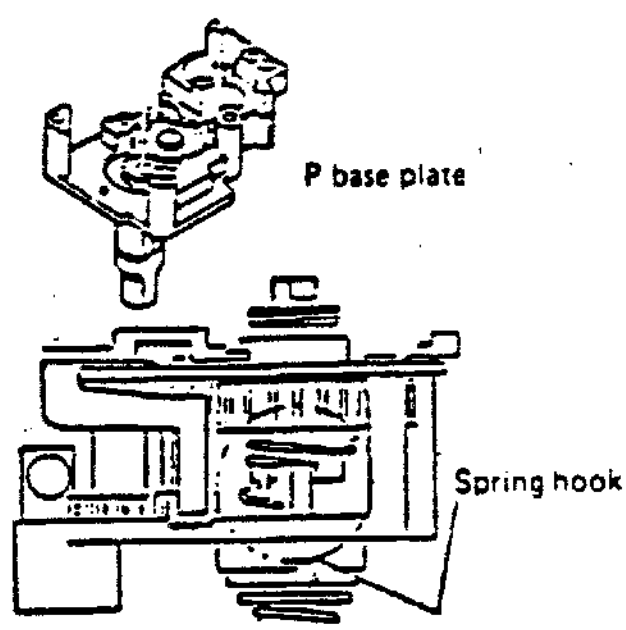
- Insert P-FW Pin CE522300 into P-FW Shaft·CE522000 until its projection becomes flush.
- Push P-FW Shaft CE522000 into the FW gear unit.
- Engage Returning spring CE522100 as shown on the right side.



3) Reassembly of FW shaft unit

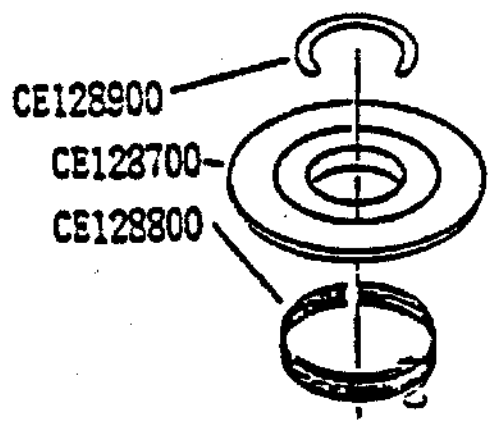
- Insert the FW shaft unit under the FW unit. (P base plate)
- Engage the returning spring with the convexity of the P base plate and locate the spring hook of the FW claw on the right side of the P base plate.
- Reassemble the U base plate.





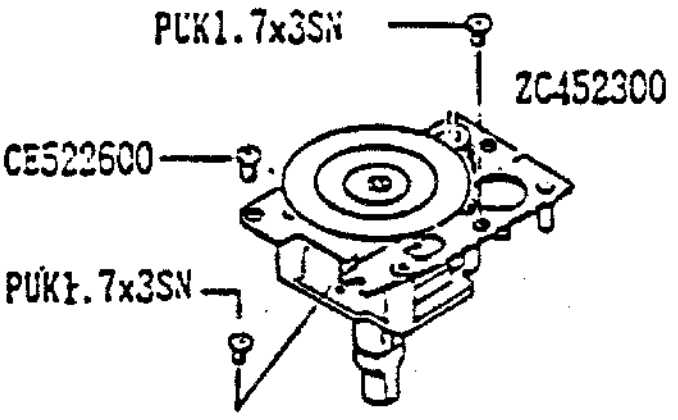
4) Reassembly of FC Upper gear CE128700

- Engage FC Spring 2 CE128800 with the projection of U base plate. Make FC Stopper CE128900 override the projection and set it in position by applying torque to FC Upper gear CE128700.



5) Reassembly of film wind unit

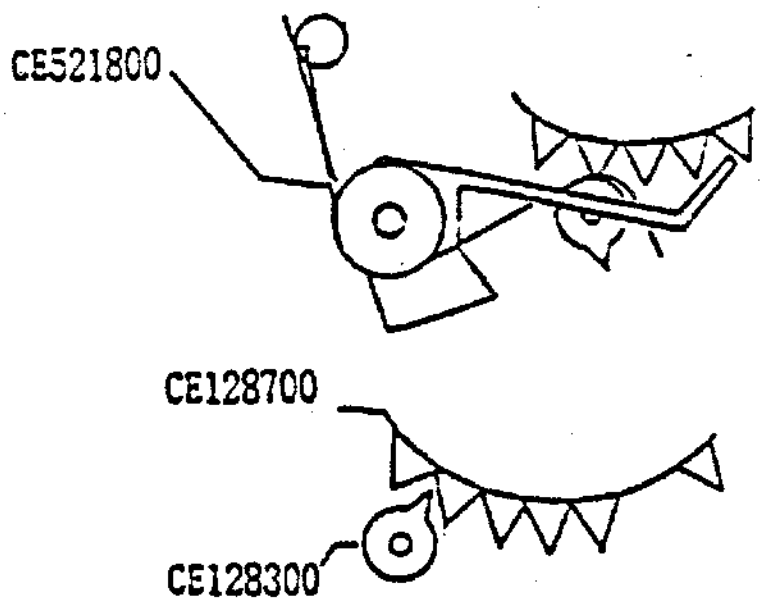
- Reassemble the film wind unit into the camera body. Tighten two Screws PUK1.7x 3SN and Screw CE522600.
  Engage P-FC Spring 2 CE521800 as shown the right side.



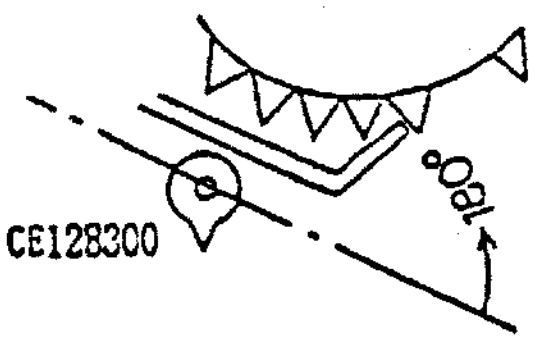
2. Adjustment of FC Upper Gear

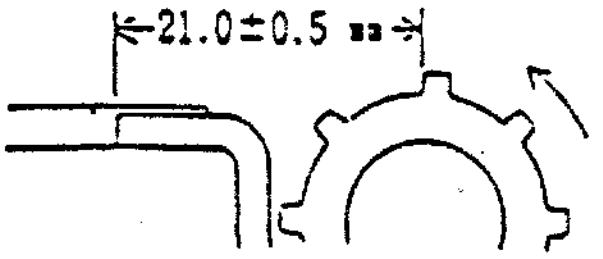
1) Positional check and adjustment of FC lower gear

- At the first film winding, FC Lower gear CE128300 must be engaged with the fourth tooth of FC Upper gear CE128700.

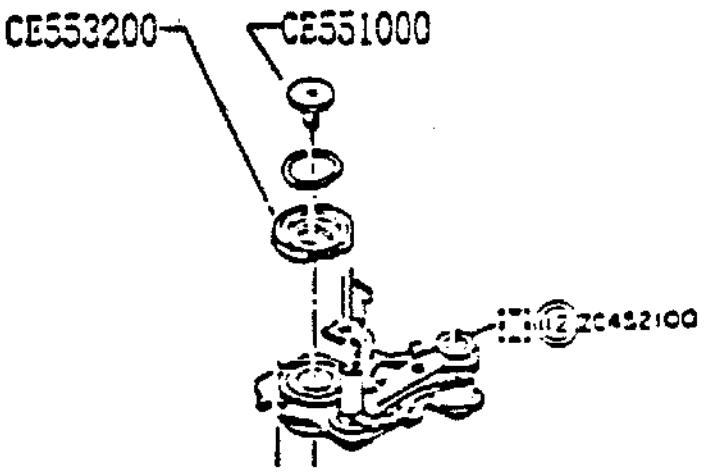


- After completing film winding, the projection of the FC lower gear must not be located within 180° on the side of the FC plate.
  Position of the FC lower gear can be adjusted after detaching No. 1 gear.



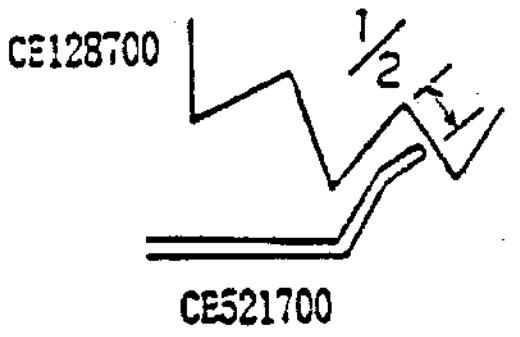


The No. 1 gear is detached for adjustment, check the sprocket for its proper position.

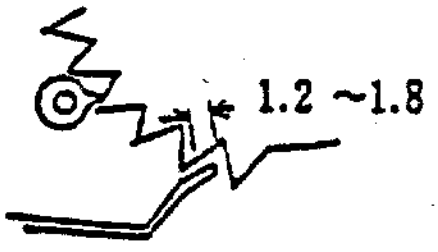


2) Engagement adjustment of P-FC plate

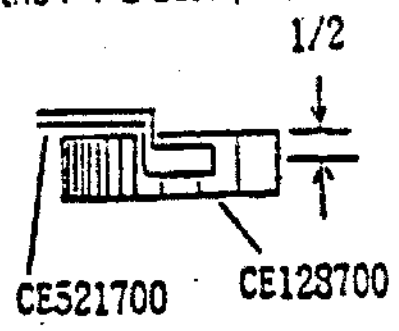
- When engagement depth of P-FC Plate CE-521700 is less than 1/2 of the tooth the FC upper gear after completing film winding, adjust the engagement depth by bending the P-FC plate.



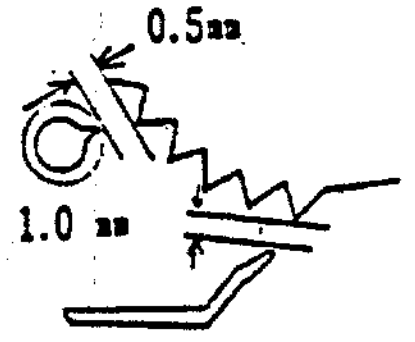
- The FC upper gear must have a feeding margin of 1.2 ~ 1.8 teeth. Adjust so as to obtain such a margin by bending the FC base plate.



- The P-FC base plate must have an engagement depth of at least 1/2 tooth thickness of the FC upper gear.
  If the engagement depth is shallow, adjust by bending the P-FC base plate.



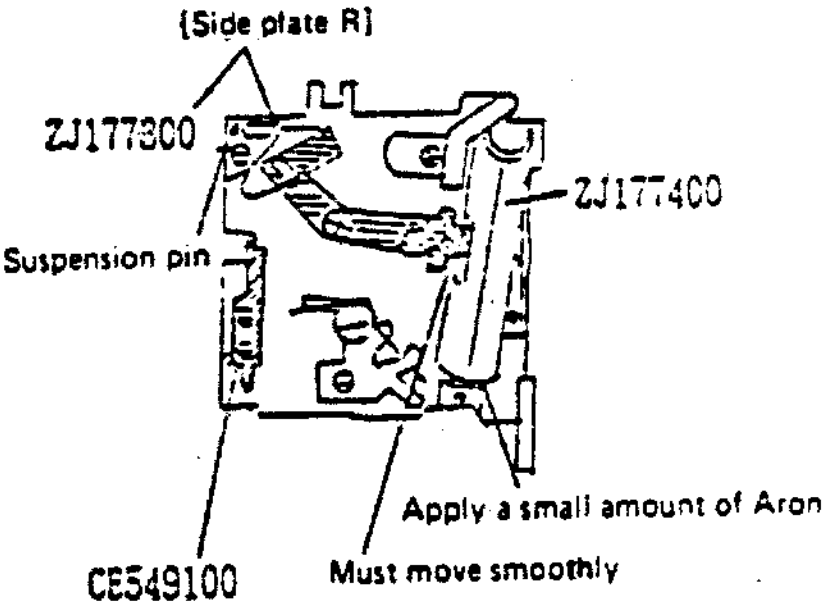
- The gap between the P-FC base plate and FC upper gear must be at least 1.0 mm along the whole circumference of the FC upper gear when the rear cover is opened gently. Gap around the lower gear must be at least 0.5 mm.



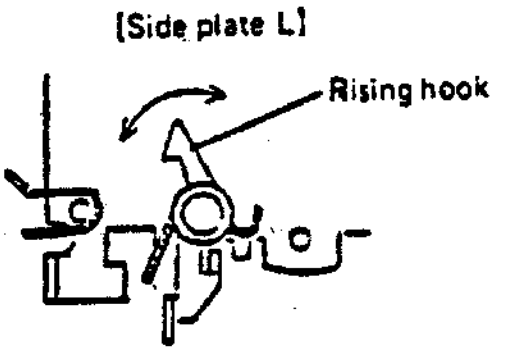
- Bond FC Plate CE236400 to FC upper gear. All the characters must be located within the range of the index. When the rear cover is opened, character "S" must be aligned with the index.

III. REASSEMBLY AND ADJUSTMENT OF FRONT CASTING UNIT

1. Check and Adjustment of Side Plate R
   - The air damper (Pipe ZJ177400) must drop smoothly with no seizure or rattling.
   - Side plate R ZJ178700 must be perpendicular to the suspension plate and in close contact with A Cam ZJ177300.
   - Fix P Lever CE541900 around the center of the adjusting hole.

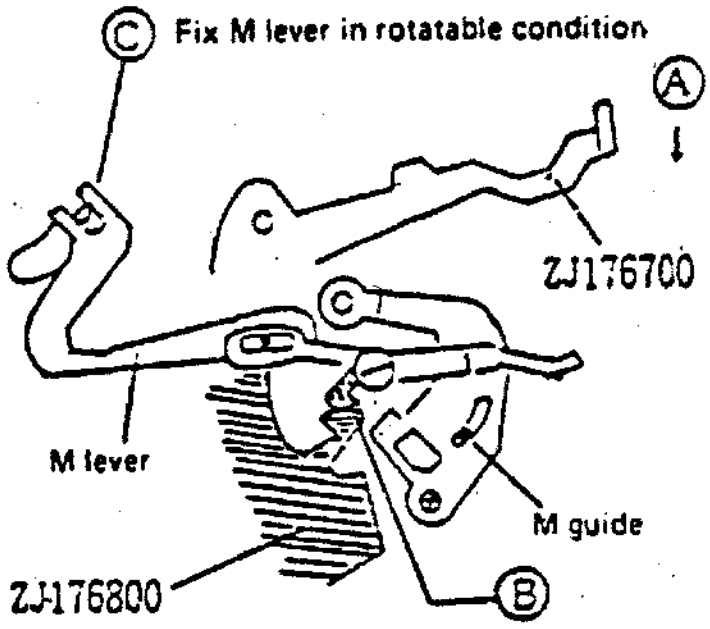


2. Check and Adjustment of Side Plate L
   1) Operational check of rising hook
      - The rising hook must move by its own weight.
      - It must not be caught even when it is moves fully in the direction indicated by arrow.



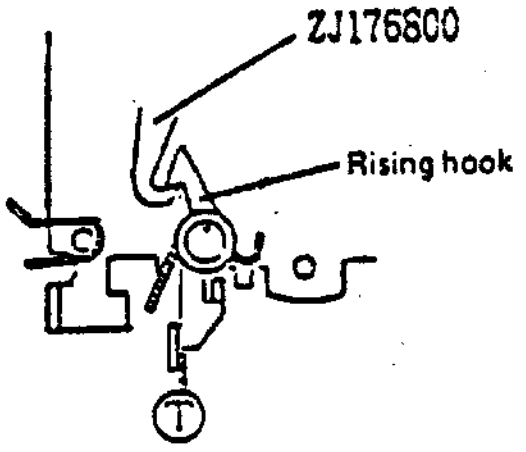
2) Engagement check of rising hook

- By turning M Charging lever ZJ176700 a little in the A↓ direction, set the engaging parts of the rising hook and F Lever ZJ-176800 at position (B). Fix M Lever ZJ-176900 at position (C). Return the M charging lever gently and make sure that the rising hook is engaged.



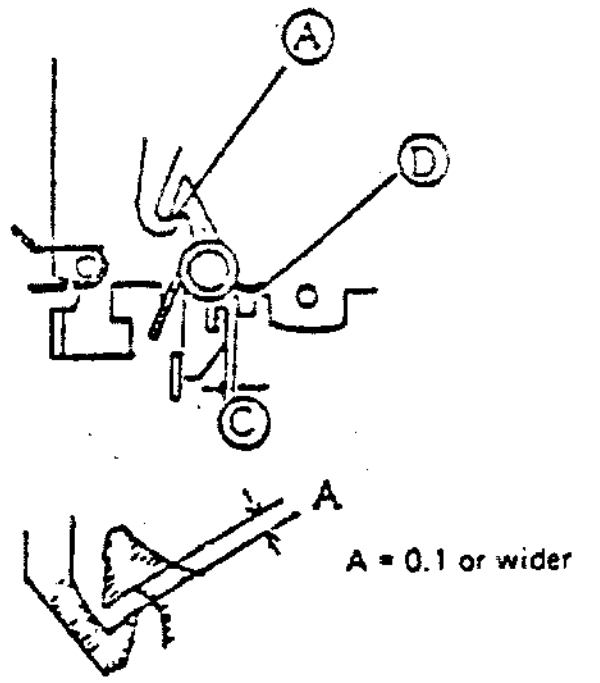
3) Force required to disengage rising hook

- With the M charging lever set in position, the rising hook must be capable of being disengaged by a force of 25 ~ 40g.



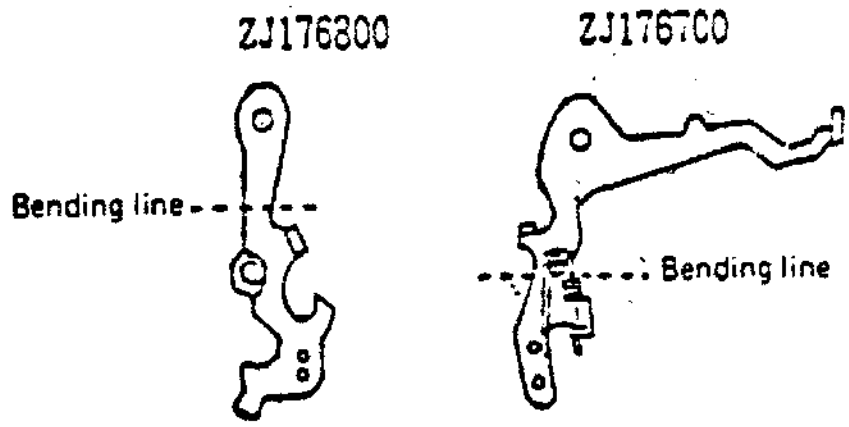
4) Engagement check of rising hook

- When requirement C = 0 ~ 0.2 is not satisfied, adjust by bending part D.
- When the rising hook is swung, the F lever must be engaged at least 2/3 of thickness of the rising hook.
- When the M charging lever is not set in position, the rising hook must be engaged in the condition shown on the right side.

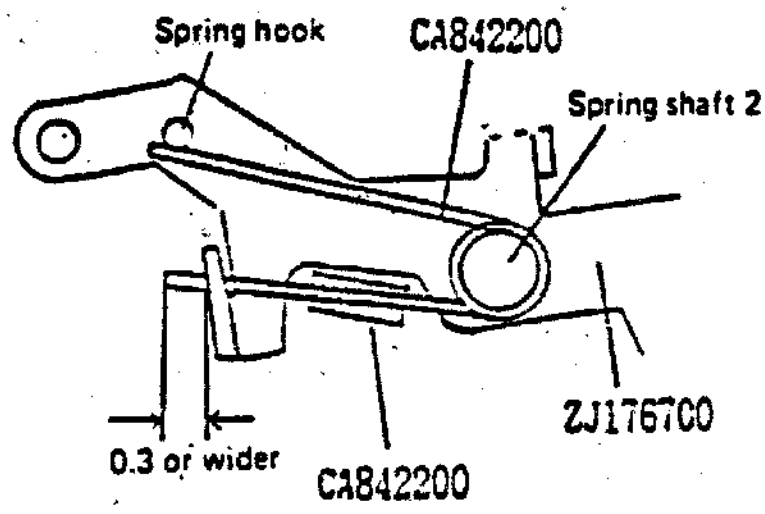


5) Operational check of F lever and M charging lever

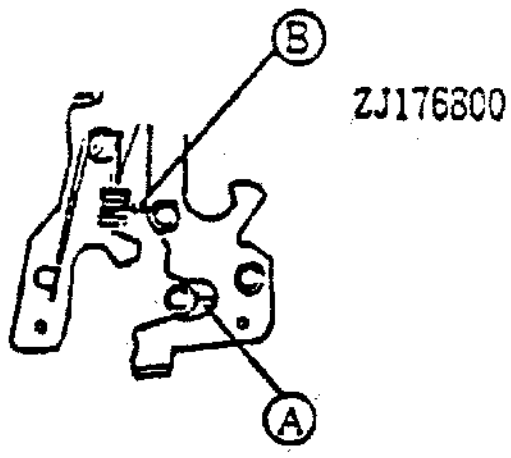
- For adjusting rattling, bend M charging lever ZJ176700 and F Lever ZJ176800.



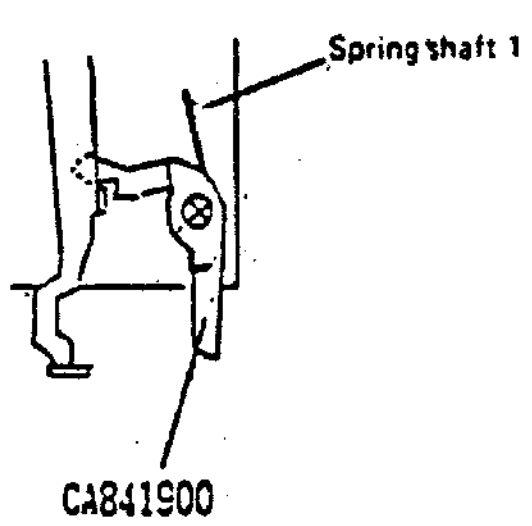
- The stopper spring must project at least 0.3 mm from the rectangular hole of the M charging lever
- Tube 2 CA842200 must be ride over the M charging lever.
- The stopper spring must be operative within the rectangular hole of the M charging lever.



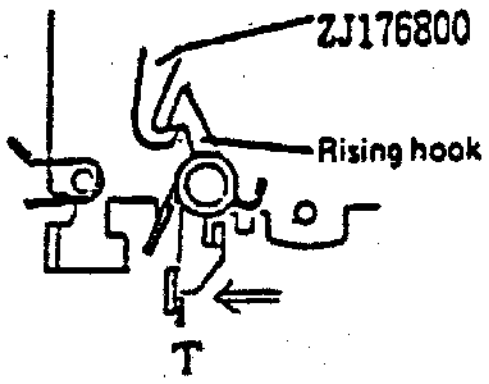
6) Stop position of F lever
- The F lever must be brought into contact first with the runner ring (part A) and then the stopper spring (part B).



7) Operational check of D hook
- D Hook CA841900 must operate by its own weight (12 ~ 18g).
- The D hook must operate before it is located 2.0 mm from the spring shaft 1.

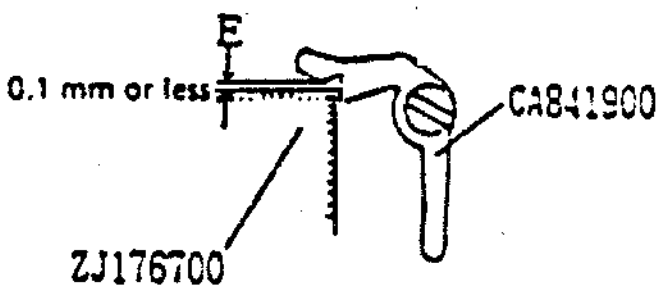


8) Force required to disengage D hook
- In a condition where M Charging lever ZJ176700 set in position and the rising book is disengaged, the D hook must be disengaged by a force of 30 ~ 100g.

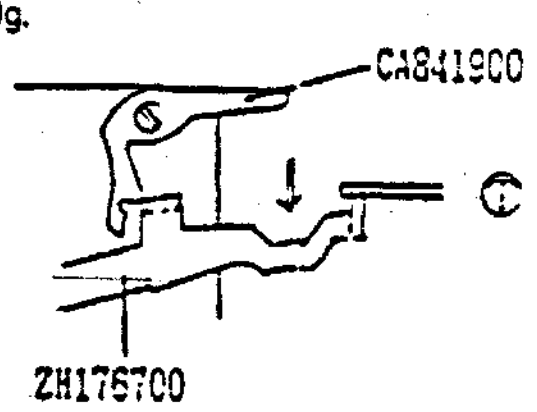


9) Engagement check of D hook
- When the M charging lever is set in position, the D hook must be engaged 0.1 mm or less with the lever.

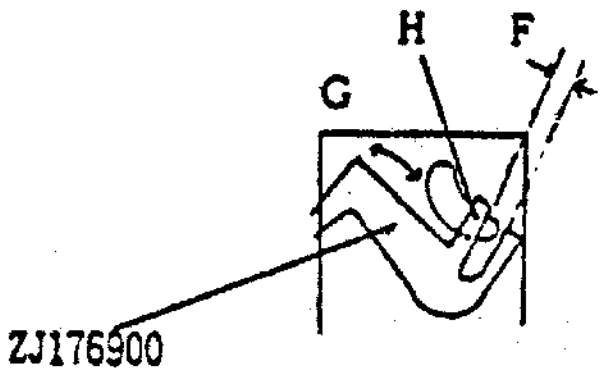
Engagement of D hook
When the D hook is engaged, it must not be disengaged by raising the M charging lever until it is flexed.



10) Force required to set M charging lever
- When the F lever is engaged with the rising hook, the D hook must be engaged with the M charging lever by a force of 460 ± 30g.



11) Operational and positional checks of M lever
- Position of M lever
When M Charging lever ZJ176700 is set in position and the rising hook is engaged, M Lever ZJ176900 must be positioned as shown below.
- The M lever must rurn smoothly.



$F = 0^{+0.8}_{-0.2}$

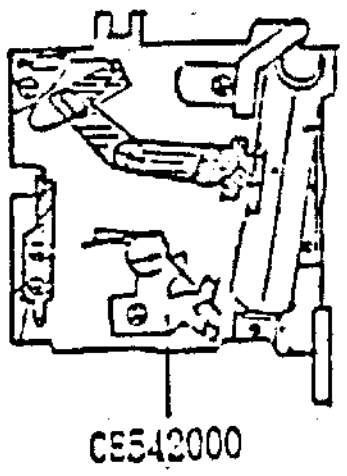
3. Adjustment of Viewfinder Focus Point

1) Correction of ununiform focusing
Detach the screen and set the jig mirror in position.
Attach the front casting unit to the ununiform focusing correcting device.

○ Correction in Y direction
Correct ununiform focusing in the Y direction by slightly moving 45 P Plate CE-542000 on the mirror stopper.

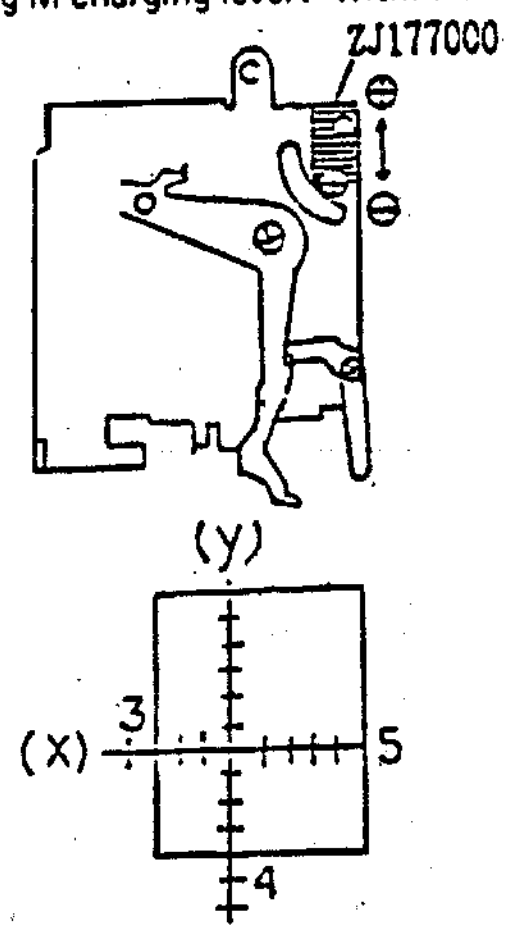
Standard: 1 ± 5'
Difference produced by
setting M charging lever: Within 4'

Use jig mirror [Side plate R]



Correction in X direction
Correct ununiform focusing in the X direction by slightly moving M Pin ZJ177000 on the mirror mount.

Standard: 1 ± 4'
Difference produced by
setting M charging lever: Within 4'

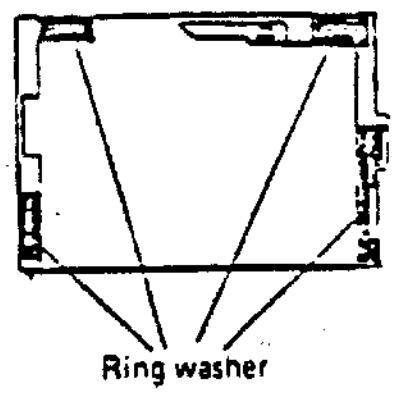


2) Positional adjustment of Fresnel lens (adjustment of F focus point)
Detach the screen and set the jig mirror in position.
Attach the front casting unit to the photoelectric collimator.

○ Turn the dial scale of the collimator and read peak position (focus point) of the pointer.
○ Select the ring washer corresponding to the read value. (0.03 ~ 0.35 mm of 33 types in 1/100 mm steps)
○ Remove the pentagonal prism and set the selected ring washer.
(Apply a small amount of Pliobond.)
○ Set the pentagonal prims in position and read the focus point once again.

Standard: $4600^{+0}_{-0.04}$ mm

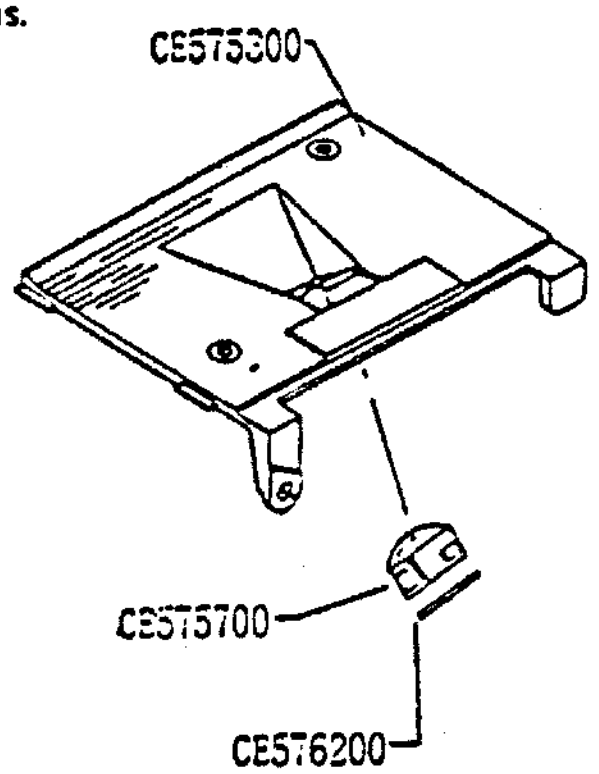
○ In the standard is not satisfied, replace the ring washer with another.
○ The M charging lever should be set for adjustment of the focus point.



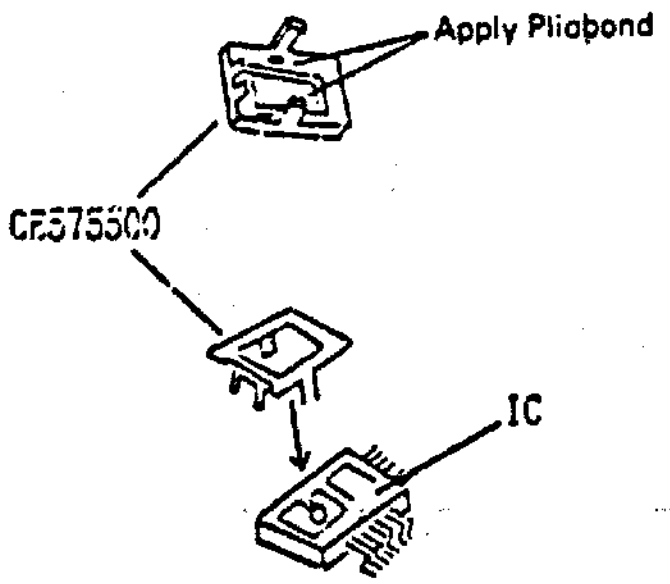
4. Reassembly and Adjustment of Photosensor Element

1) Reassembly of M lens

- Push M Lens CE575700 into L Covering plate CE575300.
  The M lens should be set in such a direction that the lens stopper is in parallel with the vertical surface of the covering plate on the side of the lens.
- Mount M Lens cover CE576200 on the M lens.

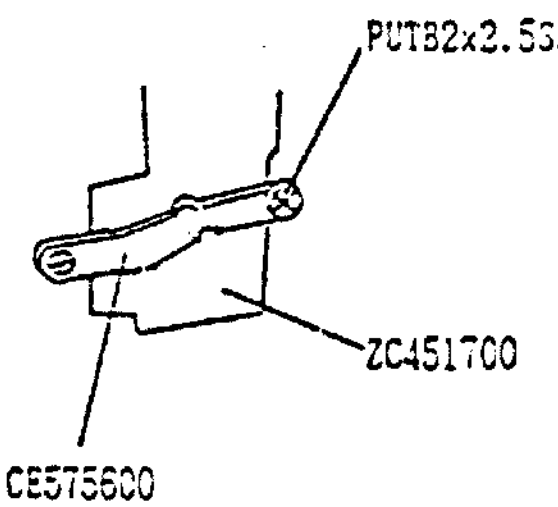


- Apply a small amount of Pliobond to L Plate CE575500 and fit it into the LC.
  Take care not to deviate the L plate and not allow Pliobond to extrude outside.



2) Reassembly of main circuit board

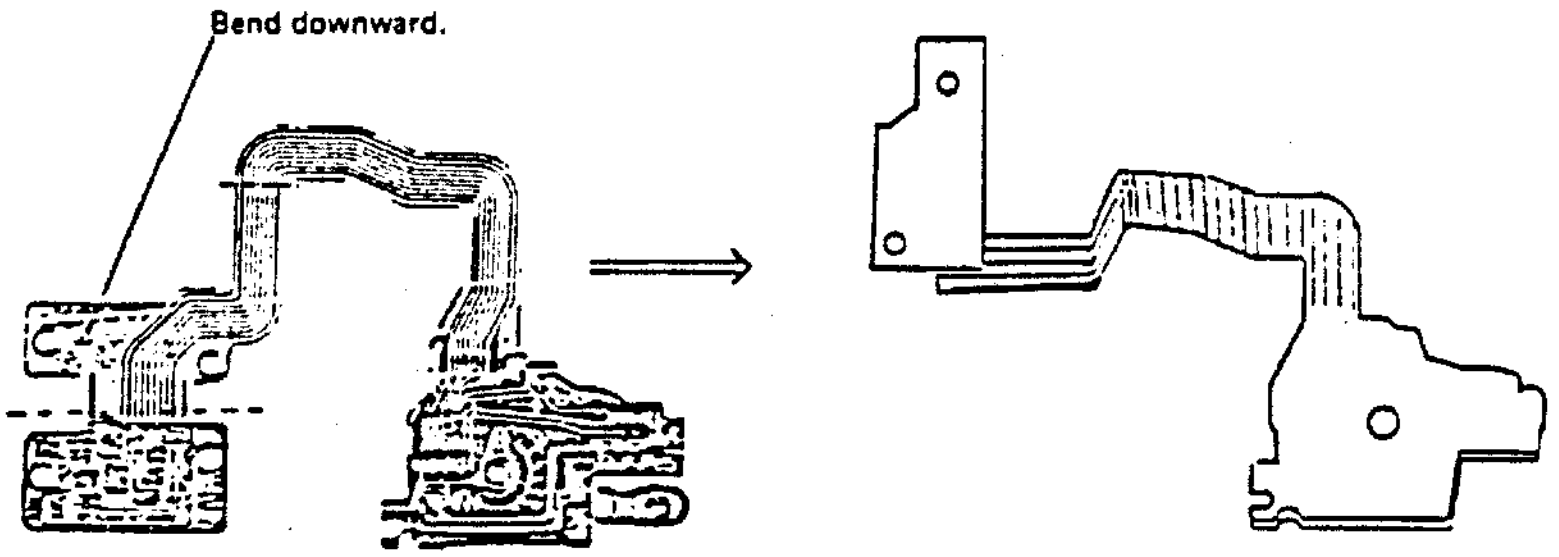
- Fit Main circuit board ZC451700 in position with its SBC matched with the L covering plate and lens cover.
  Take can not to deviate the main circuit board.
- Bring the covexity of L Stopper CE575600 into contact with Main circuit board ZC-451700 and fix it by tightening Screw PUTB2x2.5SW.
  The L stopper should be set in such a direction that the convexity is located at the center of the main circuit board.



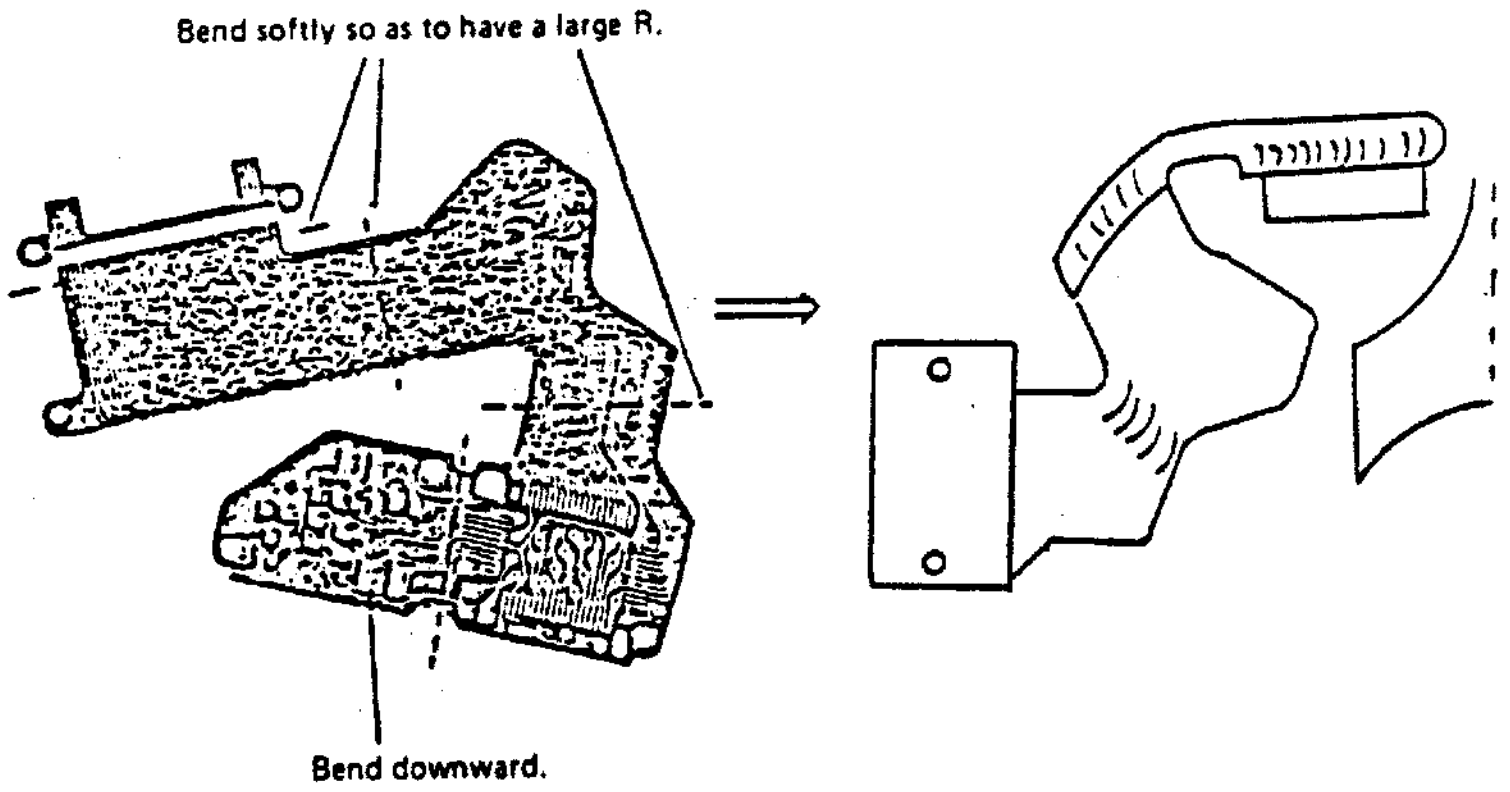
IV. FORMING OF LEAD WIRES AND CIRCUIT BOARD

1. Forming of Circuit Boards

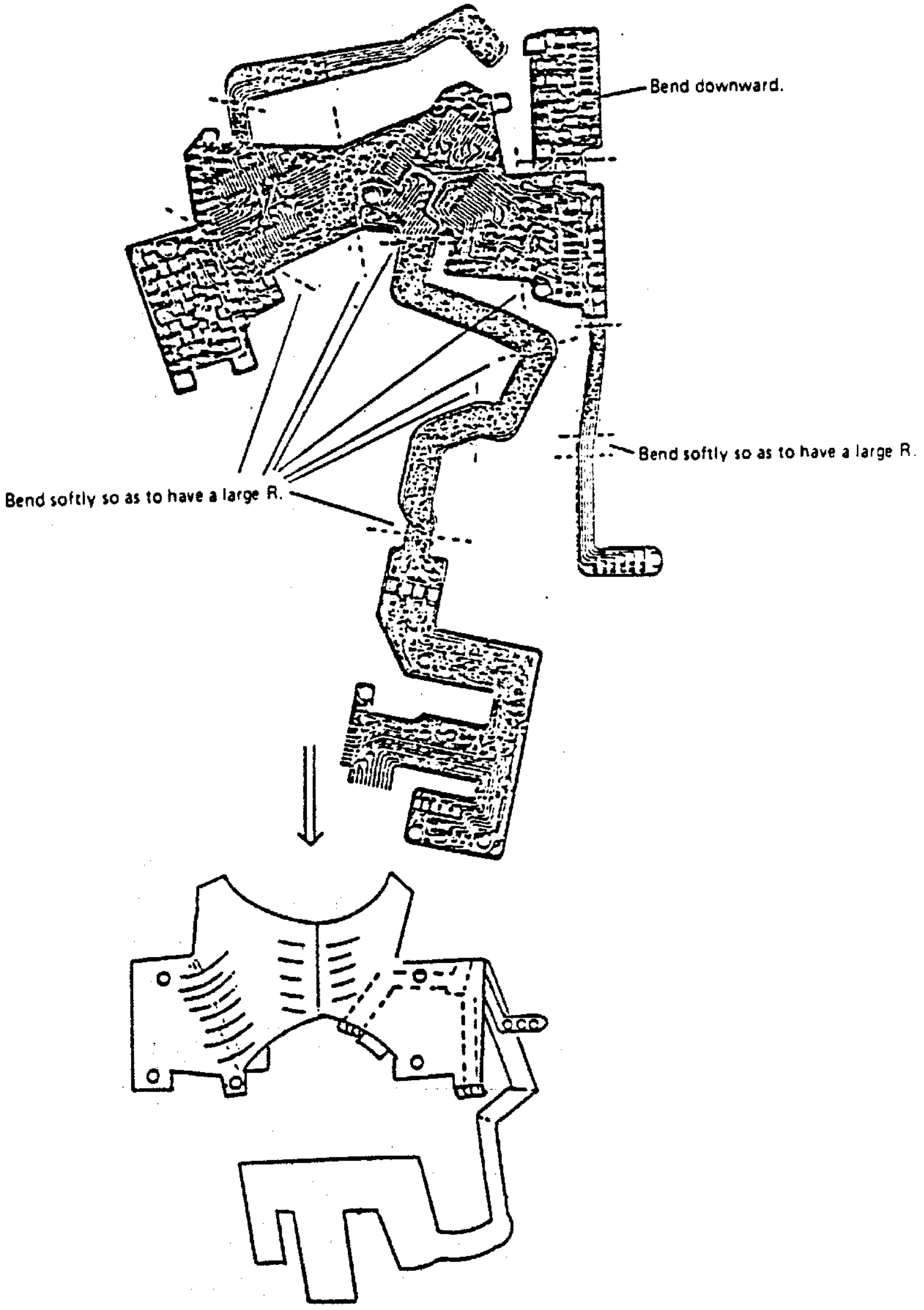
   1) TV circuit board
   Bend the flexible part as shown below:



   2) L circuit board
   Bend the right side of IC104 as shown on the right side.



3) Main circuit board
Bend as shown below:

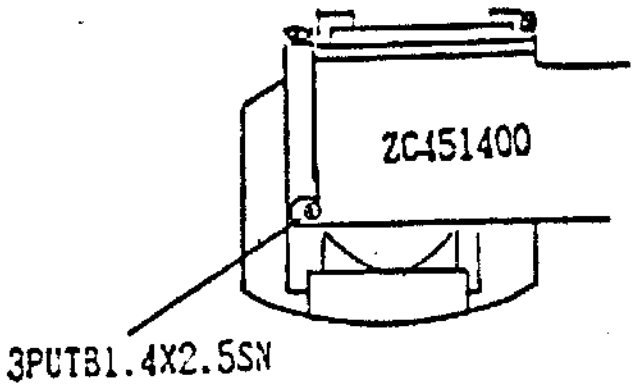


2. Reassembly of Circuit Boards

1) Reassembly of L circuit board

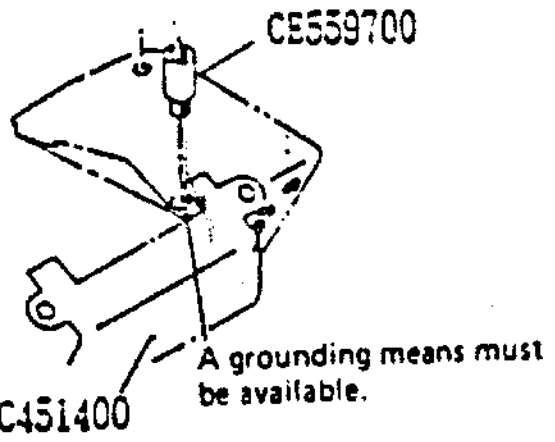
a. Form the L circuit board correctly.

b. Fix L Circuit board ZC451400 to PL Holder CE547100 of the prism with Screw 3PUTB1.4x2.5SN.

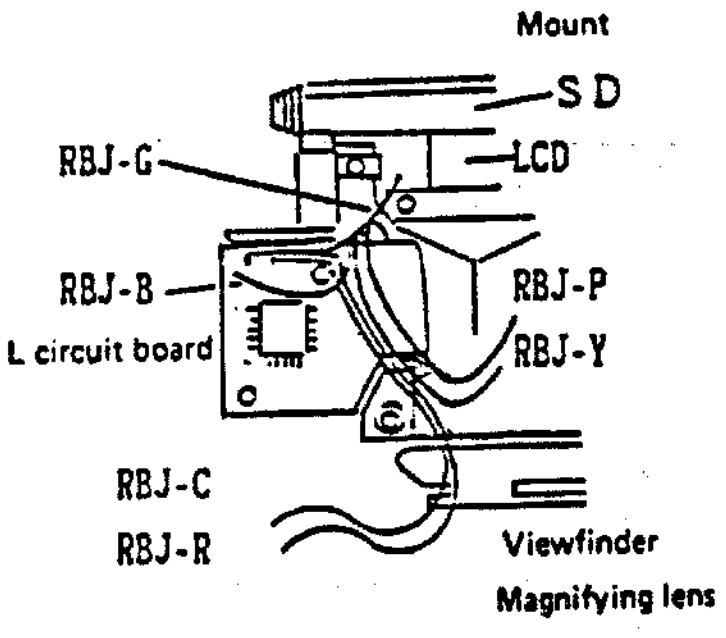


c. Set Penta prism ZC451200 in position.

d. Fix one side of the L circuit board to the front casting unit with ML Shaft CE559700.



e. Arrangement of lead wires
L circuit board: RBJ-G, RBJ-R, RBJ-C
AV circuit board: RBJ-Y
FX contact: RBJ-P
Main switch: RBJ-B
L circuit boards (M, C): RBJ-Y, RBJ-C
AV circuit board: RBJ-G, RBJ-H
Lamp switch: RBJ-W (x2)



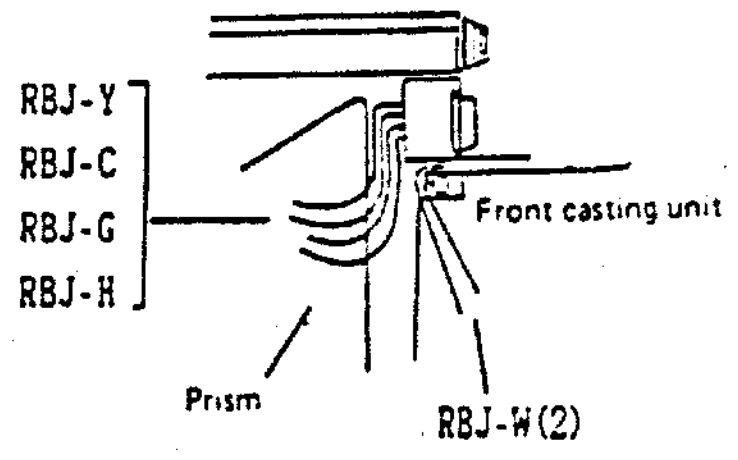
2) Reassembly of main circuit board

a. Attach the photosensor element of Main circuit board AC451700 to L Covering plate ZC450600.

b. Remove B Spring shaft CA893900 while taking care not to detach the string from the roller.

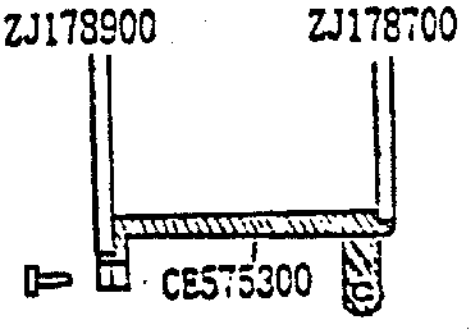
c. Pass the main circuit board under B Spring ZC138100 and set the L covering plate on the front casting unit.

d. Set B Spring shaft CA892900 in position.



e. Attach L Covering plate CE575300 to the front casting plate.

- Make sure that the front casting plate and covering plate are properly grounded by using a circuit tester.

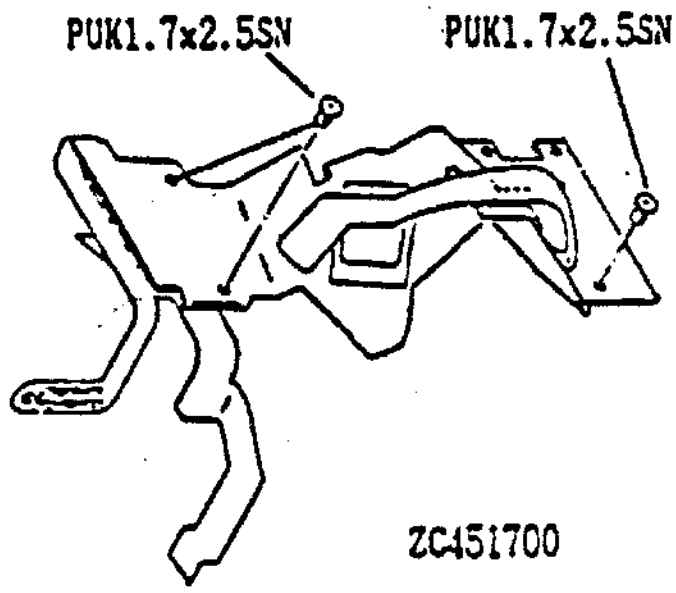


f. Form Main circuit board ZC451700 correctly.

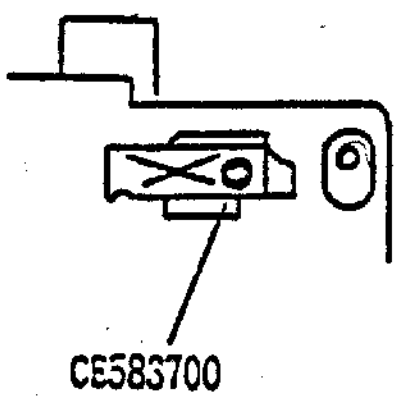
g. Fix the main circuit board to the front casting unit with three Screws PUK1.7x 5SN.

- Do not clamp the IC, three serial variable resistors and four serial variable resistors.
- The flexible board should be folded at one point only.
- The main circuit board should must be grounded through a screw.

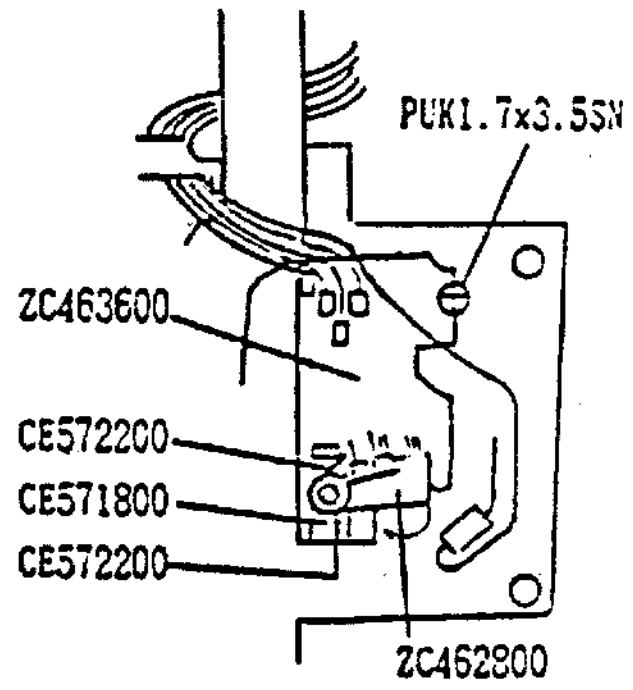
h. Mount HNW CE583700 on the front casting unit.
   ○ Mount the flexible board with the variable resistors aligned with the NW holes.
   ○ After the variable resistors are mounted, they must be arranged horizontally without inclination as seen from the front side.



3) Reassembly of SE circuit board
   a. Mount SE Circuit board ZC463600 and clamp it with Screw PUK1.7x3.5SN.
      ○ The SE circuit board must be connected to the camera body for grounding.
   b. Pass the four lead wires of the SE circuit board and RBM-B of the LED between the front casting unit and flexible board.
   c. Set SE Holder ZC462800 in position.
      ○ Clicking touch must be felt from SE Lever CE571500 when it is operated.
      ○ The SE contact must be brought into secure contact with no floating.

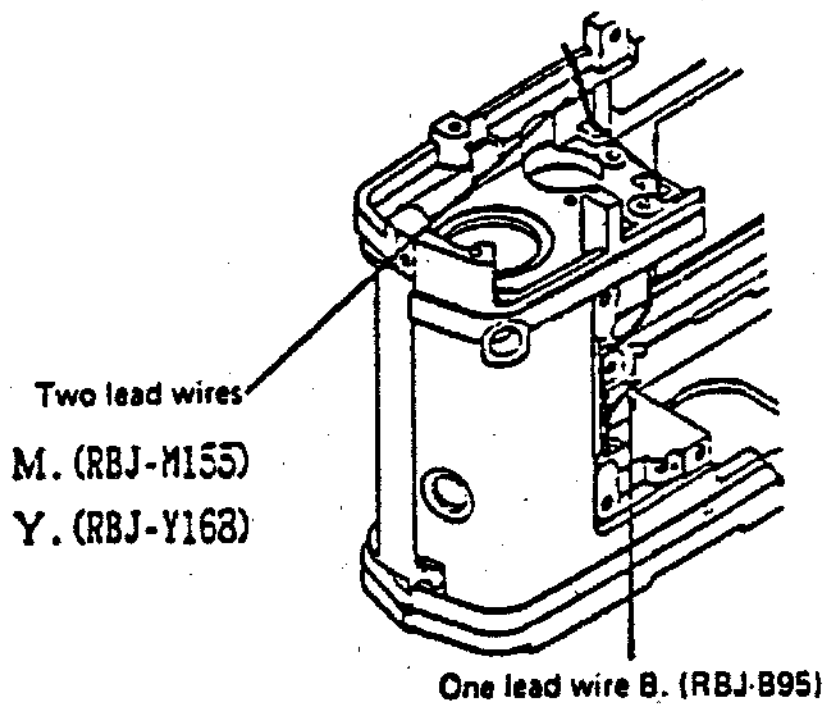


4) Reassembly of thyristor and front casting unit lead wires
   a. Fix F Covering plate CE571400 with Screw PUK1.7x2.5SN.
      ○ Reassemble while urging the front covering plate toward the prism.
   b. Cut off the feet from Thyristor DS-114400 and bond it to the magnifying lens attaching part of the viewfinder with Pliobond. The feet should be 3 ± 0.5 mm long.
   c. Set the tube in parallel with the IC between the IC and viewfinder magnifying lens.
   d. Solder each lead wire.

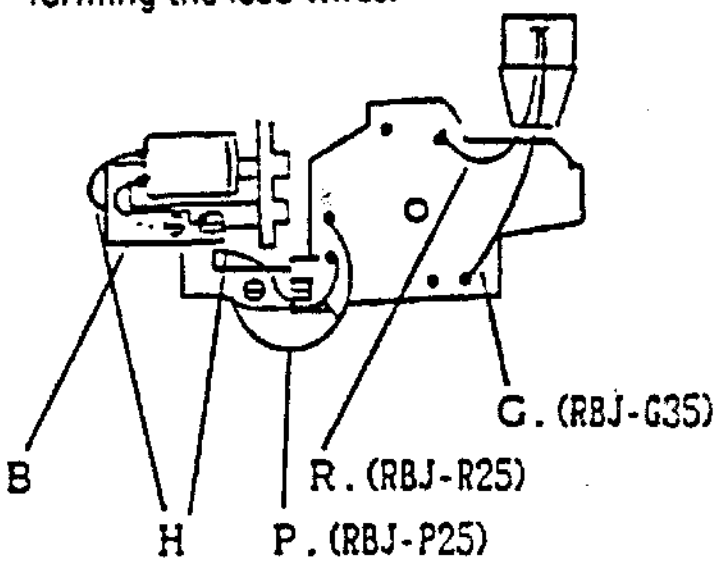


3. Forming of Lead Wires

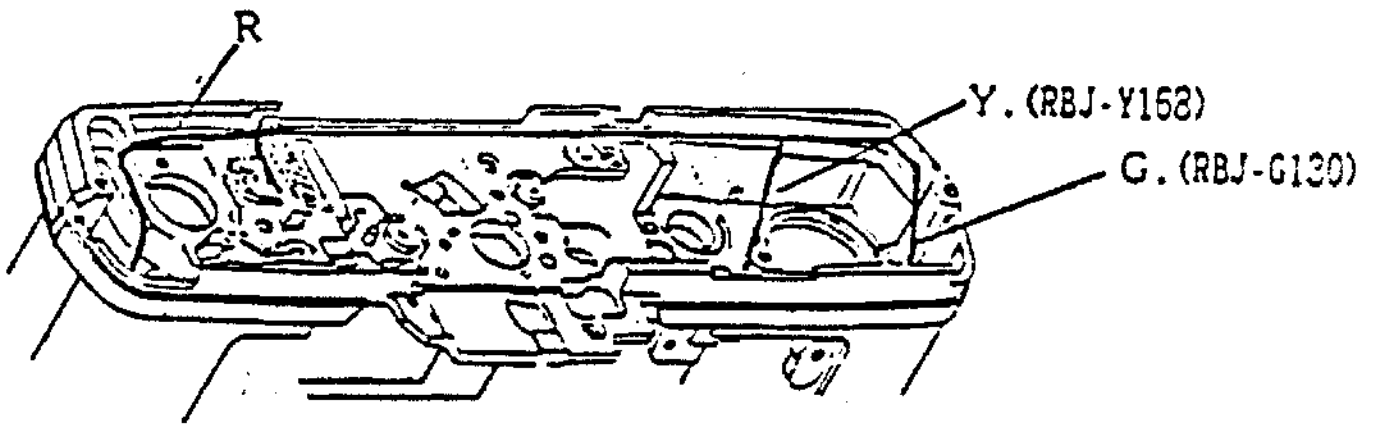
   1) Forming D contact cord of power cord
   Bond lead wire (M) of D Contact CE-108000 and lead wire (Y) of RK Switch CE520800 under the release spring.



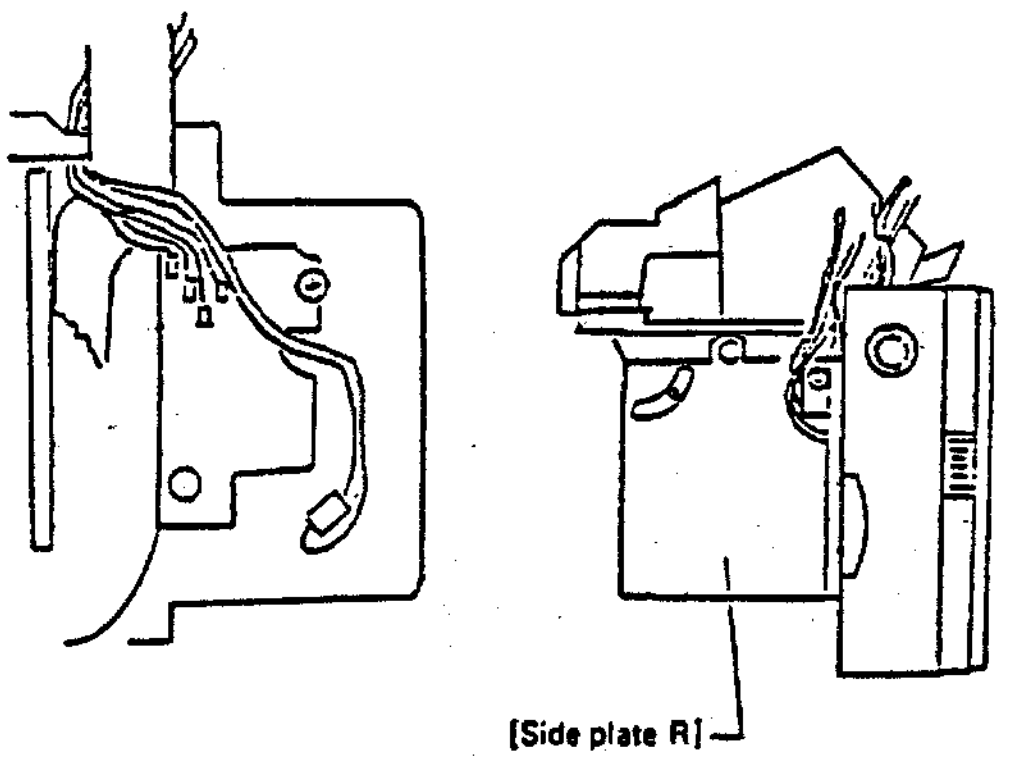
2) Forming lead wires of TV circuit board
Do not hold the IC or electric element for forming the lead wires.



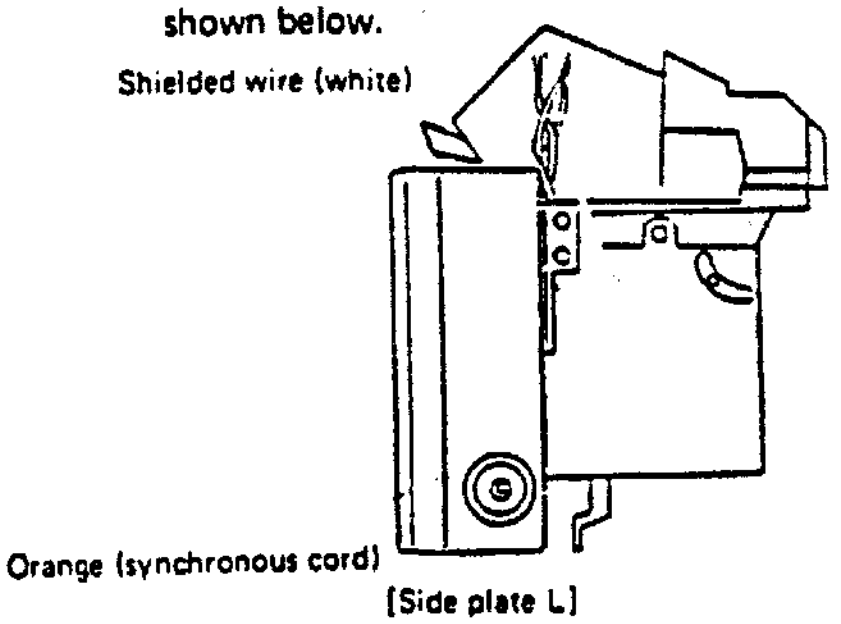
3) Forming lead wires of SW base plate



4) Forming lead wires or side plates
a. Form the lead wires of side plate R as shown below.
Bring all the lead wires of side plate R toward the port and pass them beside the B spring plate.

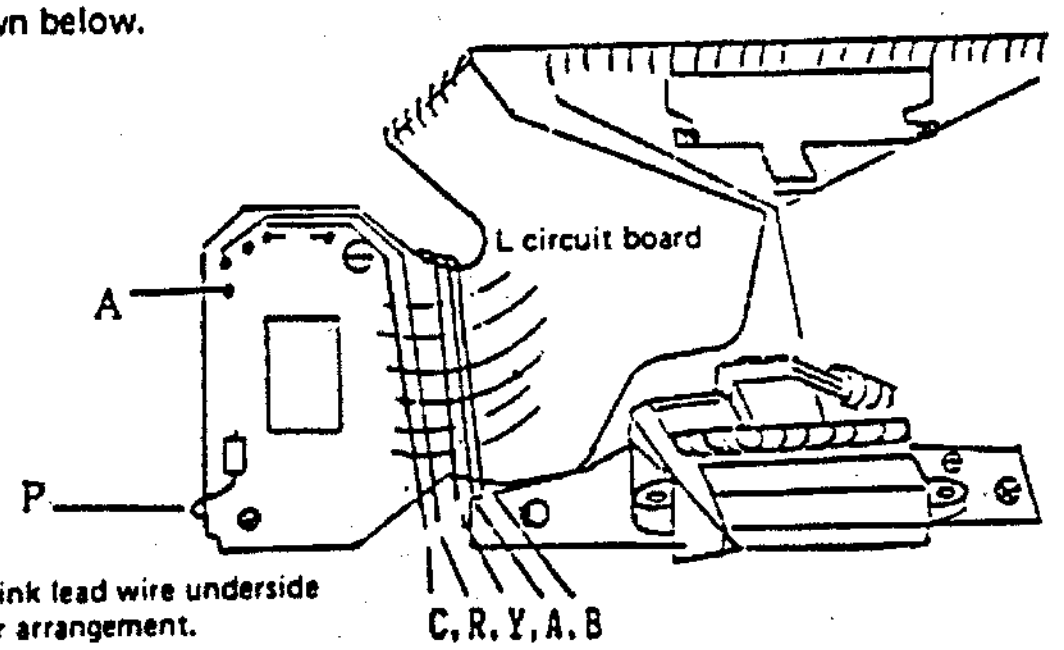


b. Form the lead wires of side plate L as shown below.



5) Forming lead wires of penta prism unit

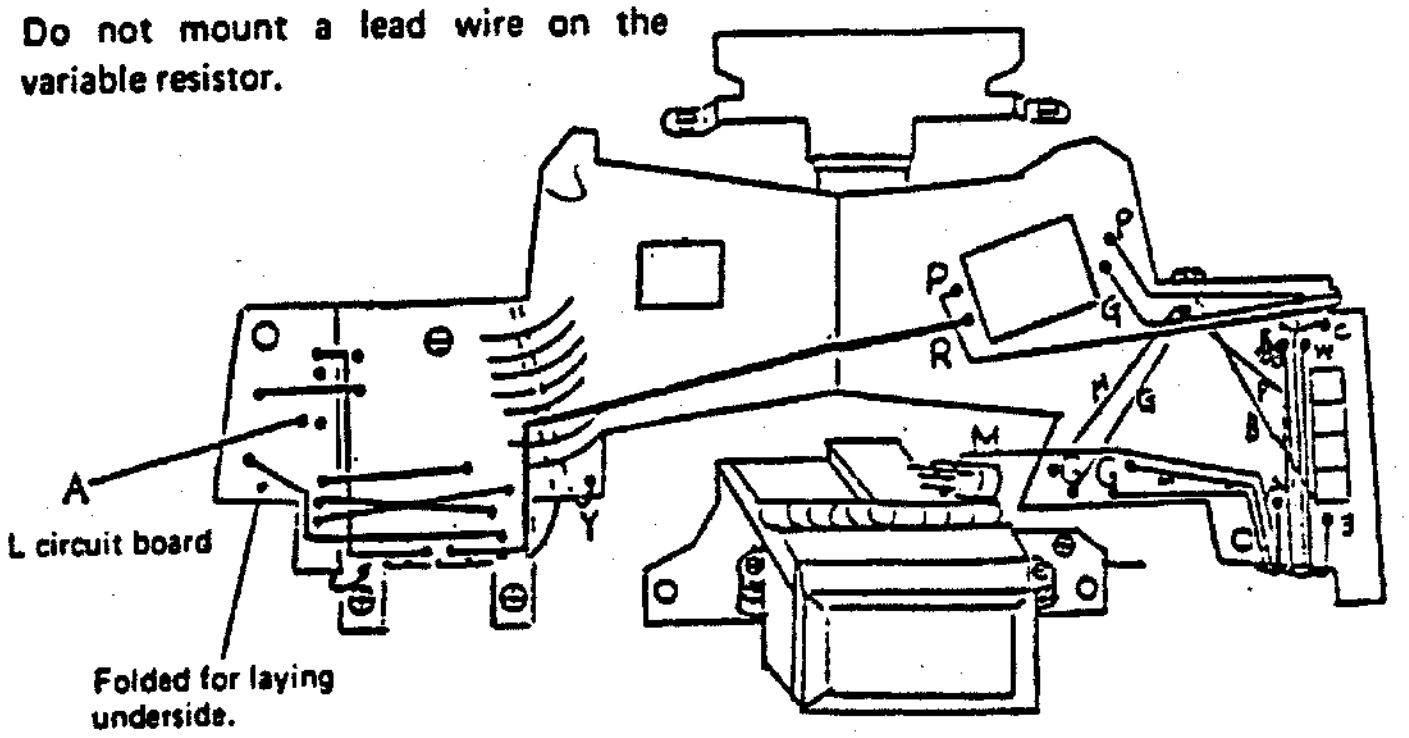
a. Form the lead wires of L circuit board as shown below.



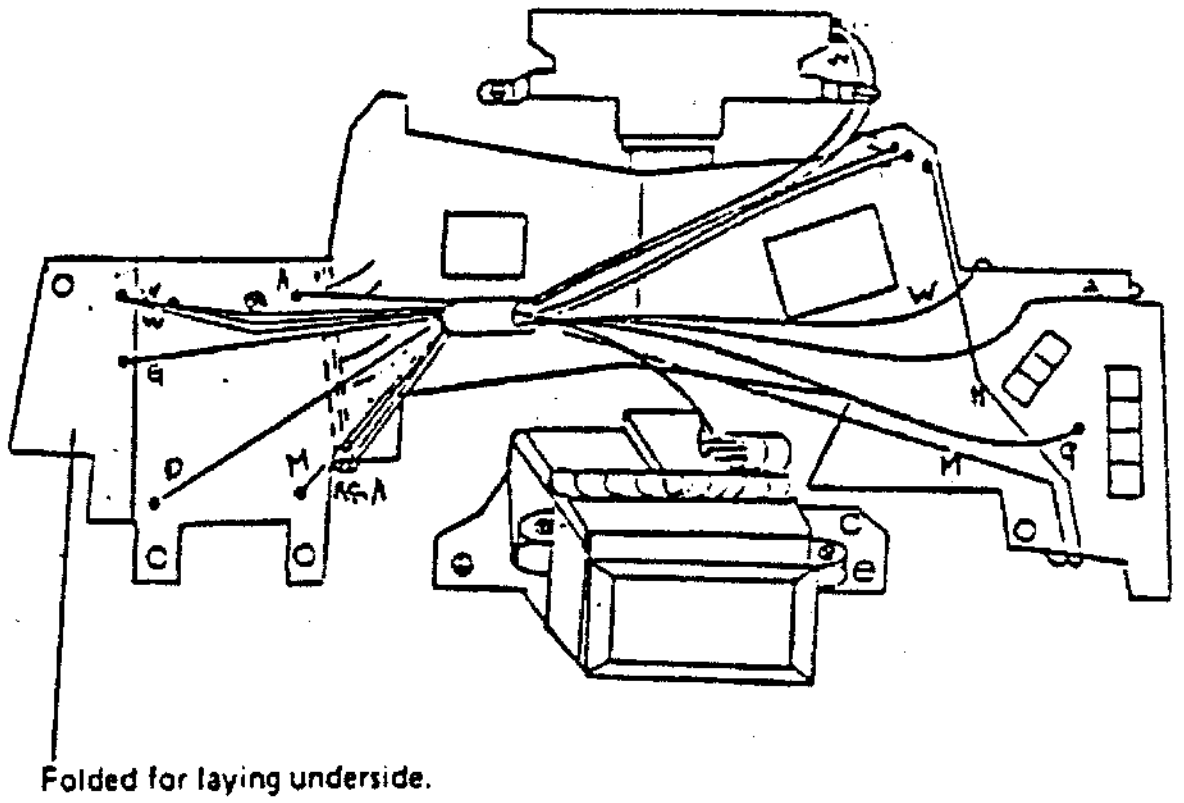
b. Forming lead wires of main circuit board

o Forming lead wires between circuit boards

Do not mount a lead wire on the variable resistor.

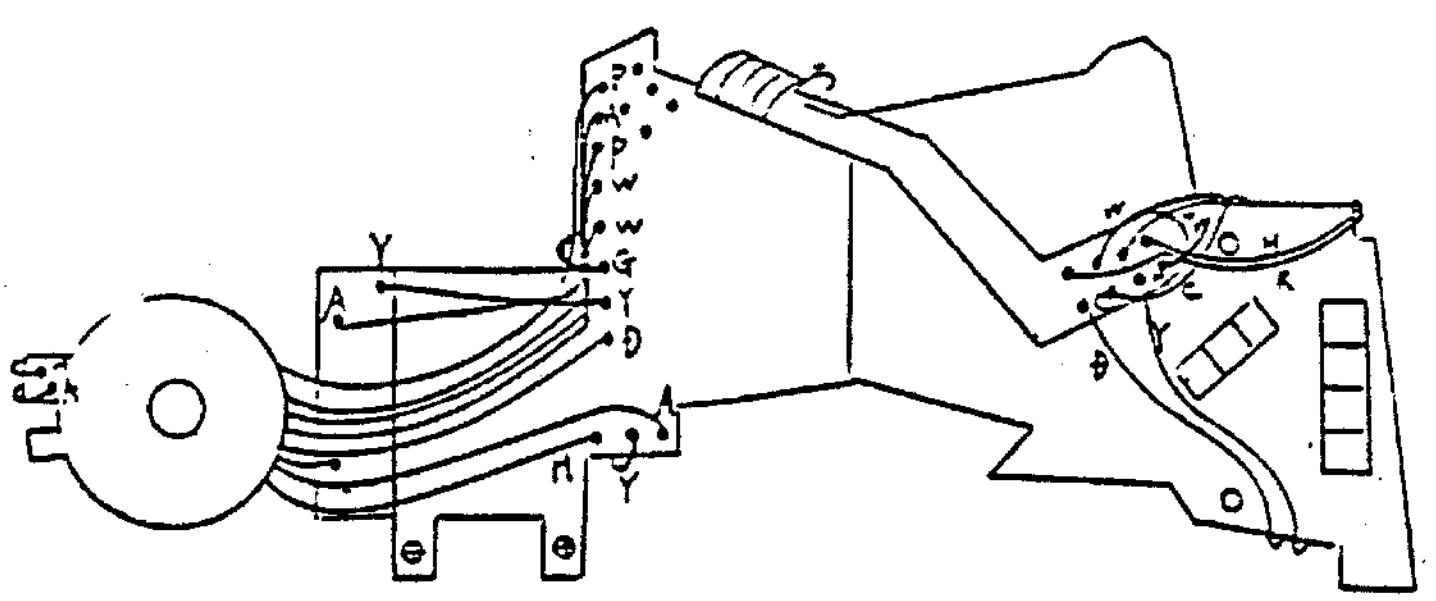


- Forming lead wires bundeled with tube



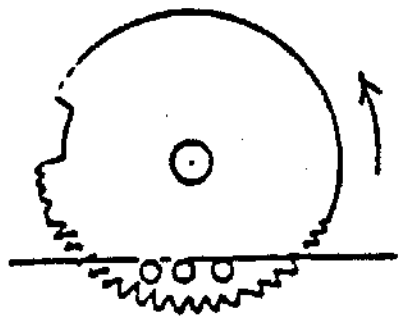
Folded for laying underside.

- Forming lead wires for mode and key inputs



V. REASSEMBLY OF FRONT CASTING UNIT

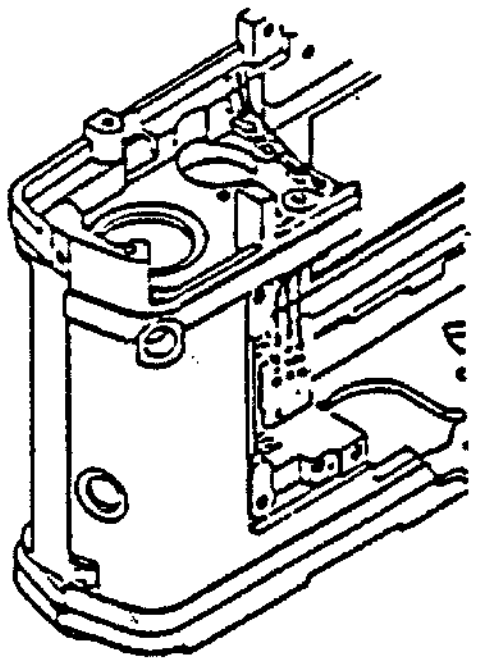
1. Positioning of TV Gear
   - Turn ZC451300 counterclockwise to position the mechanism at 1/60.
2. Set the shutter dial at 1/60.



These three holes are visible when the mechanism is set at 1/60.
Do not turn the TV gear in the opposite direction.

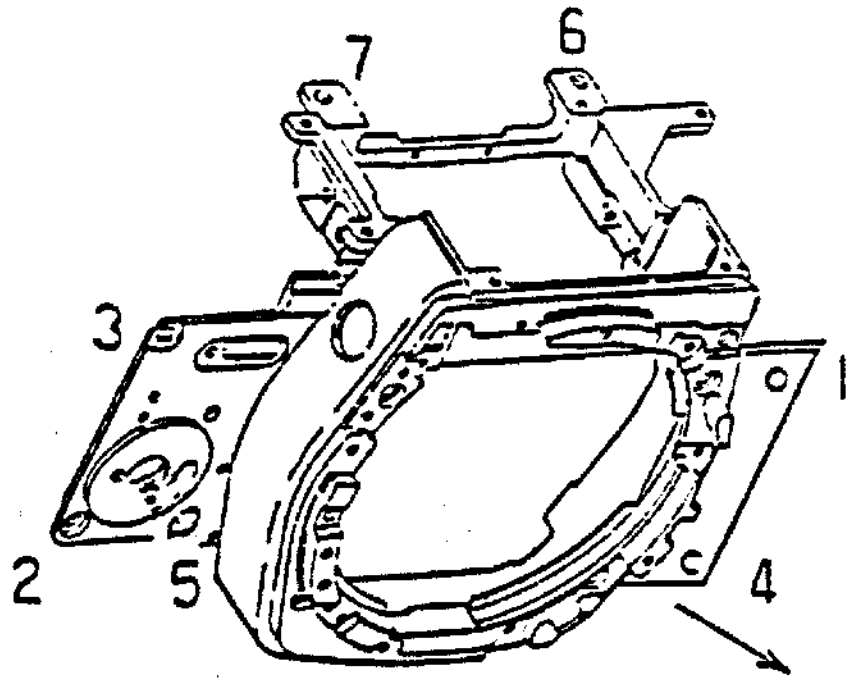
3. Arrange the nine lead wires from the TV circuit board, one lead wire from the D contact and two lead wires from the display switch on the rear of the camera body.

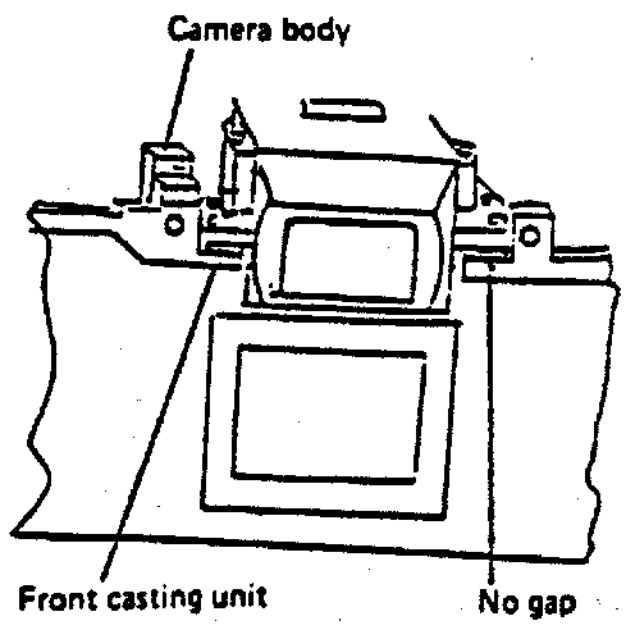
Forming lead wires leading from the TV circuit board



4. Set the front casting unit into the camera body.
   - Pass S Release ZJ128400 of side plate L into the notch hole formed in the camera body.
   - Take care not to catch each lead wire.
   - Take care to properly position M Lever 2 CE503800 and M Charging lever ZJ176700.
   - Take care to properly position KM Lever ZC452800 and M charging lever.
   - The camera body and front casting unit must be free from rattling.
   - Moltplane must not be extruded on the upper or lower sides.
   - Take care not to catch the main circuit board between parts.
   - While locating the front casting plate at the lower right side as seen from the front side, fix it with five F Screws CA915500.
     The F screws should be tightened in the foilowing sequence:
     Tighten the F screws in the diagonal sequence.
     Tighten the selftimer lever screw before and after tightening the F screws.
   - No (vertical) gap should remain between Screw PUK1.7–516 and the eyepiece of the front casting unit.
     Use ring washer when the gap is wider than 0.2 mm.
     When a ring washer is already used, do not place another on under the ring washer.

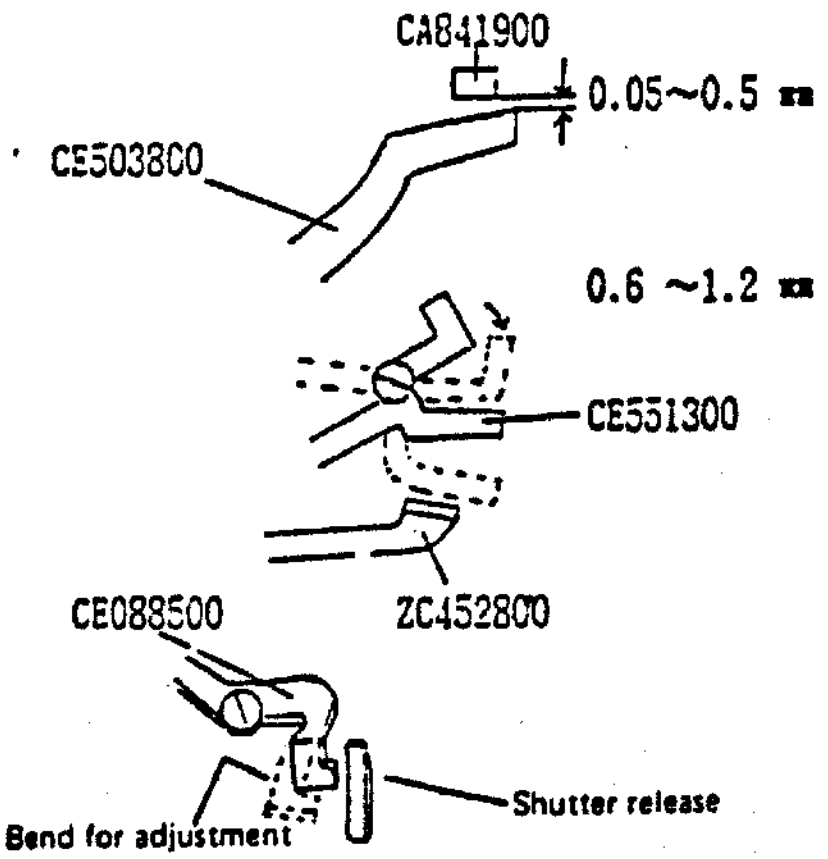
Setting direction of front casting unit and screw tightening sequence

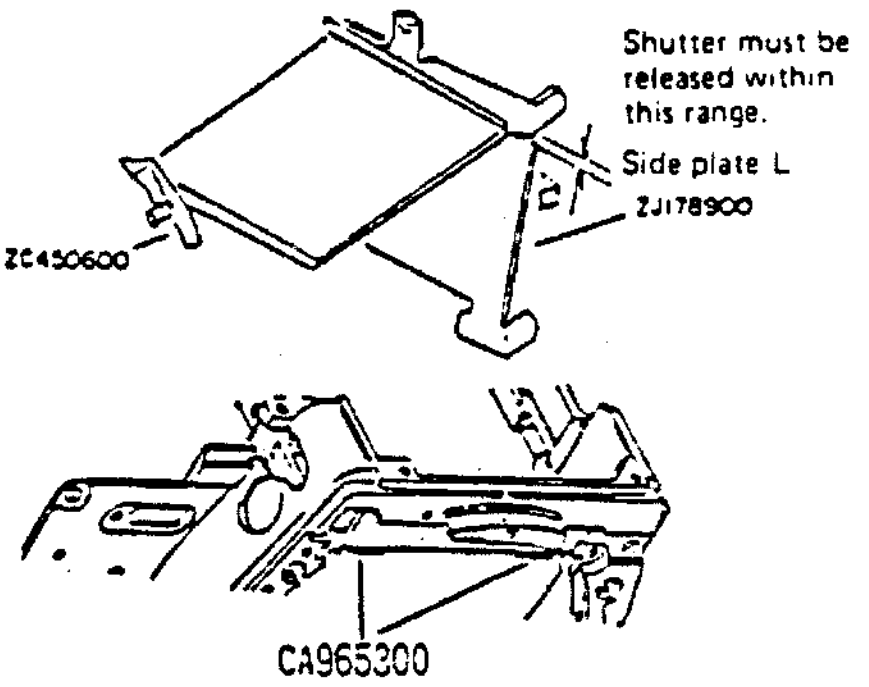




5. Checks and confirmations after fixing the front casting unit

- Gap between the front casting unit and camera body frame;
  Back-forth: 0.3 mm max.
  Vertical: 0.2 mm max.
- Engagement between TV Gear ZC451300 and Dial gear CE537300;
  Engagement depth: At least equal to thickness of the TV gear
- Gap between M Lever 2 CE503800 and D Hook CA841900
  0.05 ~ 0.5 mm with the shutter released and mirror set at the DOWN position;
  Vertical engagement: At least equal to thickness
- mzmzmz
- Overcharging (charging after the D hook springs in) of the M charging lever: 0.6 ~ 1.2 mm.
- Overcharging of K Plate A CE088500: At least 0.2 mm with no overriding of K plate B.
- Shutter releasing position
  The shutter should be released while the lower end of the M frame is located within the range of the groove fromed in the side plate L. (Check in B mode.)
- Stop position of mirror at its ascending time
  The mirror should be stopped when M Frame ZC450600 is brought into contact with Damper CA965300.
- The shutter must be locked at a position other than 1/60 with the battery removed.





VI. CHECK AND ADJUSTMENT OF EXPOSURE CONTROL CIRCUIT AND INDICATION CIRCUIT

After the main circuit has been replaced with a new one, the following adjustments are necessary:

(1) SVCV matching adjustment
(2) TV adjustment: Regeneration EE adjustment (at manual 1/8 sec.)
Treg. adjustment (at manual 1/2000 sec.)
(3) EE adjustment: Direct EE adjustment
(4) Indication adjustment: BV adjustment Auto (average auto mode)
Spot adjustment

Adjustments (2) through (4) mentioned above must be performed at repair time even when the main circuit board is not replaced with a new one.

All the other items have been already been adjusted properly.

1. Adjustment of Main Circuit Board
   The main circuit board requires the following adjustments for SVCV matching:
   1) I ref. adjustment
   2) AV/TV adjustment
   3) DAC adjustment
   4) CV indication adjustment

   These adjustments must be performed in the sequence listed above. When I ref. for example, is adjusted, all the subsequent adjustments must be performed once again. Further, it is necessary to check and adjust TV and EE indication.

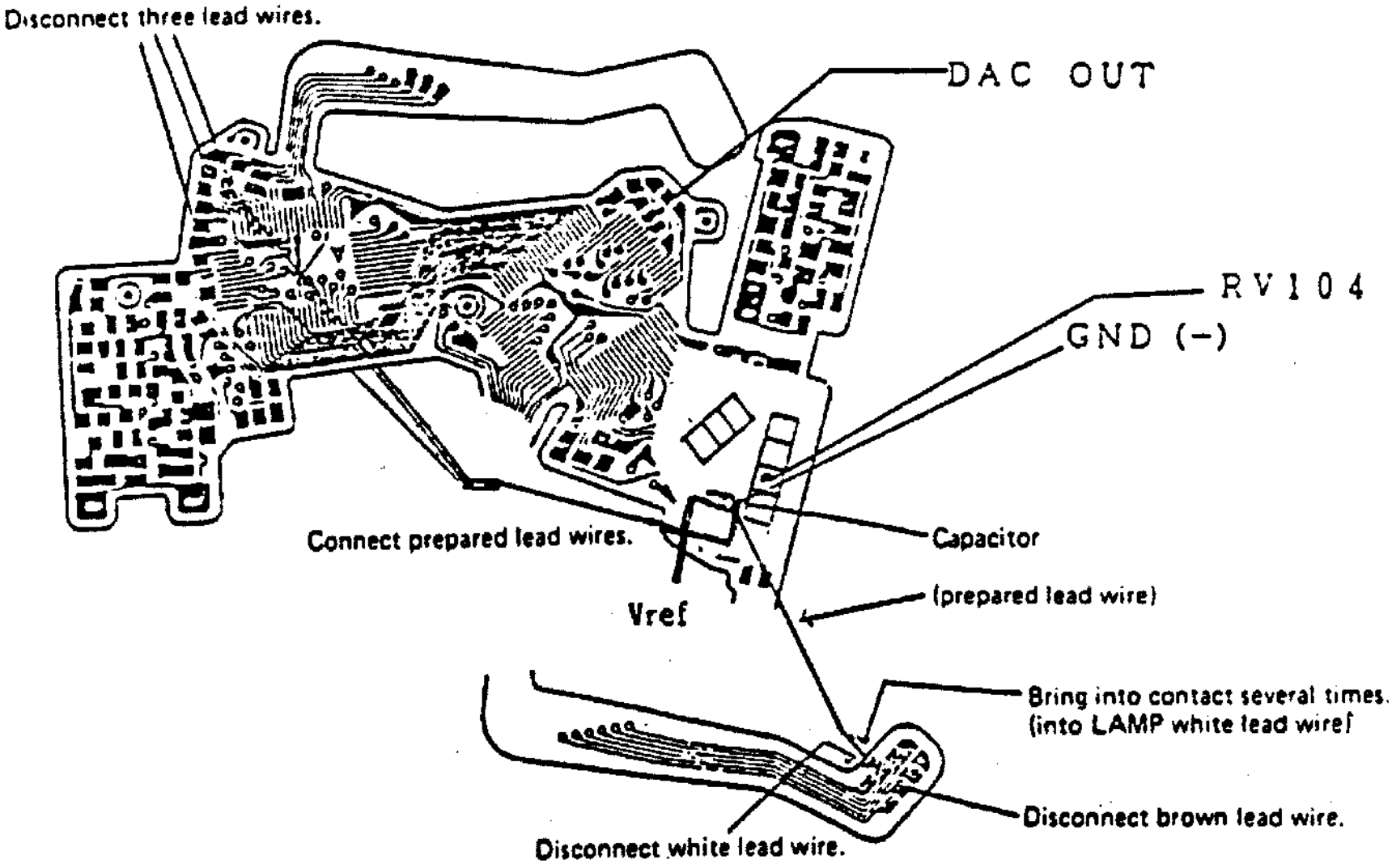
Preparation for adjustments

(1) Required equipment

a. Lens (MS5018)
b. Six lead wires (about 10 cm long)
c. Digital voltmeter
d. Thermometer
e. VR adjusting wrench

(2) Preparatory works

a. Detach the upper plate.
b. Disconnect the three lead wires from the circuit boards:
W (white), MANU P (pink) and SHAD, MEMO brown lead wires from BC, SELF and LAMP circuit boards.
c. Disconnect the two lead wires from the circuit board:
W (white) and SPOT, MCLR brown lead wires from the LAMP circuit board.
d. In place of the lead wires disconnected at step (b) above, solder three of the prepared lead wires and connect their other ends to GND (–).
e. Solder two of the prepared lead wires to Vref and DAC OUT.
f. Connect the prepared lead wire to GND.



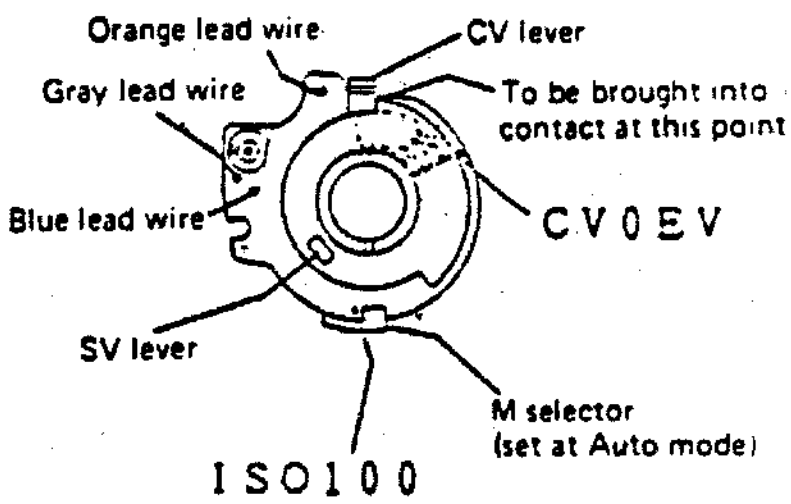
(3) Procedure to start check program

a. Mode: Auto or Manual (do not select the self mode)

b. SD: B, mechanism at position other than 1/60

c. Lens: Set. F No. optional

d. Bring the GND (–) lead wire into contact with LAMP terminal (from which the white lead wire was disconnected) several times. Now, the program is started.

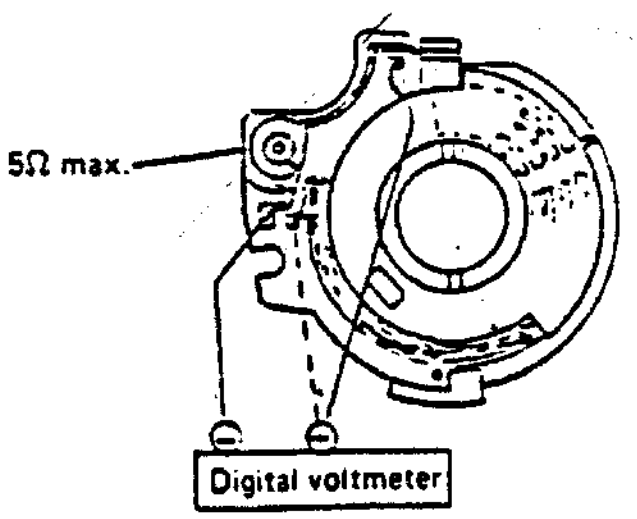


1) I ref. adjustment

○ Standard values
(Variable depending on temperature. ISO3200)

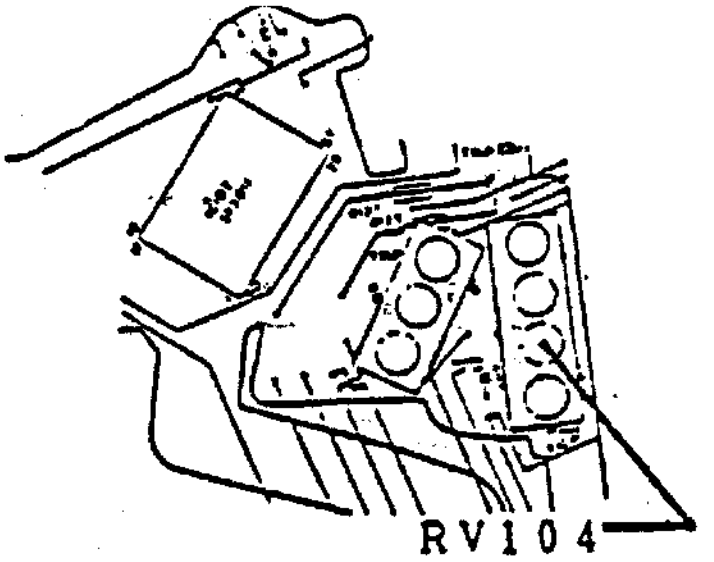
(A) Voltage across gray and orange wires

20°C – 35.4 mV ± 0.3 mV
22°C – 35.7 mV ± 0.3 mV
24°C – 35.9 mV ± 0.3 mV
26°C – 36.2 mV ± 0.3 mV
28°C – 36.4 mV ± 0.3 mV
30°C – 36.7 mV ± 0.3 mV



(B) Voltage across gray and blue wires

20°C – 198 mV ± 10 mV
22°C – 199 mV ± 10 mV
24°C – 200 mV ± 10 mV
26°C – 202 mV ± 10 mV
28°C – 203 mV ± 10 mV
30°C – 204 mV ± 10 mV



○ Measuring procedures

a. CV: 0 EV

b. ISO: 3200

c. Self the ± correcting resistor below 5Ω.

d. Measure temperature at the side.

e. Measure voltage across gray and orange lead wires.

f. Then, check voltage across gray and blue lead wires.

g. Check whether or not the voltage is at the standard value corresponding to the temperataure measured at the site. It must be within the standard range.

○ Adjusting procedure

If the standard is not satisfied, adjust voltage by turning RV104.

2) AV/TV adjustment

○ Standard values

(Variable depending on temperature.)

20°C – 205 mV ± 0.5 mV
22°C – 206 mV ± 0.5 mV
24°C – 207 mV ± 0.5 mV
26°C – 209 mV ± 0.5 mV
28°C – 210 mV ± 0.5 mV
30°C – 211 mV ± 0.5 mV

○ Measuring procedures

a. CV: 0 EV

b. ISO: 3200

c. Set the ± correcting resistor below 5Ω.

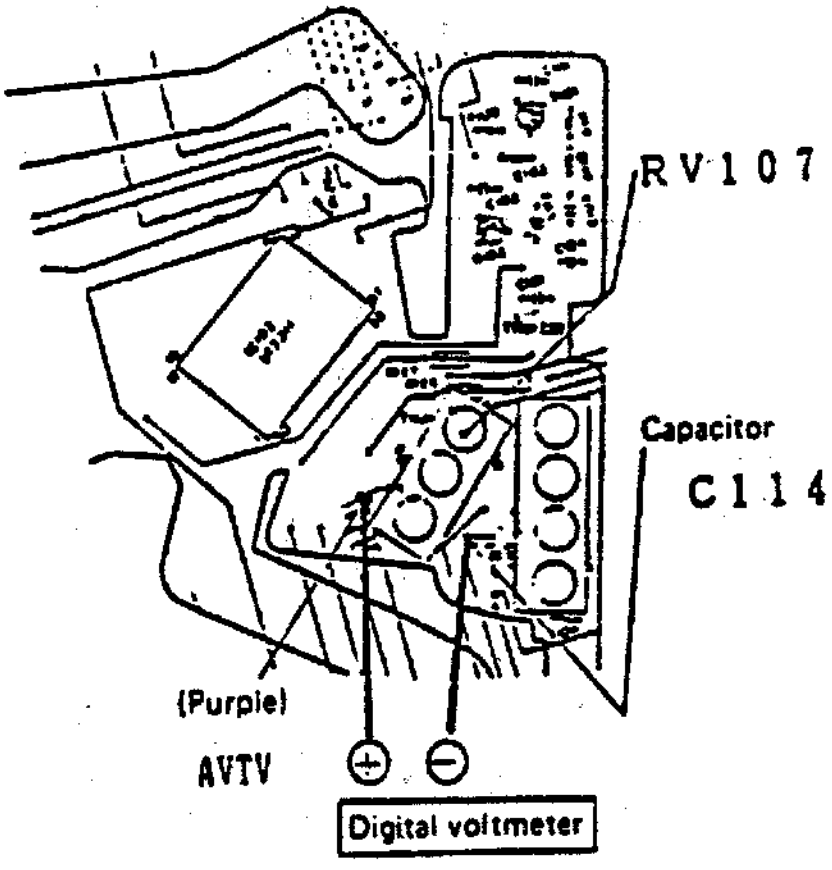
d. Measure temperature at the site.

e. Measure voltage across Vref-AV/TV.
(Connect the positive and negative terminals of the digital voltmeter to the AV/TV terminal and Vref lead wire respectively.)

f. Check whether or not the voltage is at the level corresponding to the temperature at the site. It must be within the standard range.

○ Adjusting procedure

If the standard is not satisfied, adjust by turning VR107.



3) DAC adjustment

○ Standard values

(Variable depending on temperature)

20°C – 197 mV ± 0.5 mV
22°C – 199 mV ± 0.5 mV
24°C – 200 mV ± 0.5 mV
26°C – 202 mV ± 0.5 mV
28°C – 203 mV ± 0.5 mV
30°C – 204 mV ± 0.5 mV

○ Measuring procedures

a. CV: 0 EV

b. ISO: 3200

c. Set the ± correcting resistor below 5Ω.

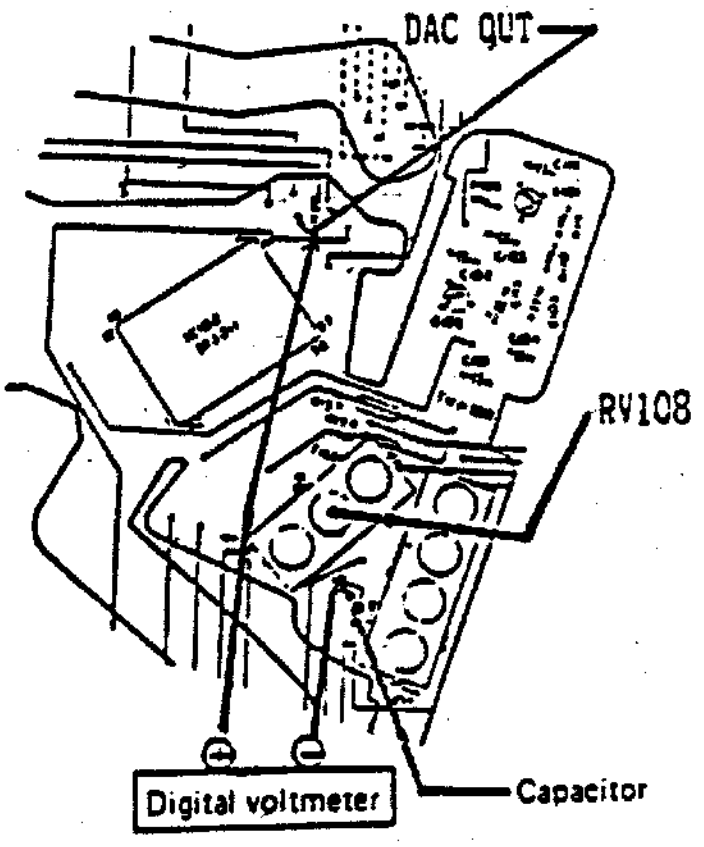
d. Measure temperature at the site.

e. Measure voltage across Vref – DAC OUT.
(Connect the "+" and "–" terminals of the digital voltmeter to the Vref and DAC OUT lead wires by using cripping connectors.)

Check whether or not the voltage is at the standard level corresponding to the temperature at the site. It must be within the standard range.

○ Adjusting procedure

If the standard is not satisfied, adjust by turning RV108.



4) Adjustment of CV indication

○ Standard value

The CV lamp must light at the first right and left (+ and —) click (±1/3 EV).

○ Adjusting procedures

a. Disconnect the six lead wires used for the measurement.

b. Solder the other six lead wires (disconnected for the measurement) in their initial conditions.

c. Mount the CV adjusting jig in position.

d. Set the camera in the BC mode. Stop the PCV.

e. Observe the indication within the viewfinder.

f. Confirmation of ± indication

Set the LV adjusting CV click at the left side position and turn the ± correcting resistor above the SV until the ± indicator is extinguished.

Make sure that the ± indicator is extinguished. Set the CV click at the right side position. The ± indicator should normally be extinguished.

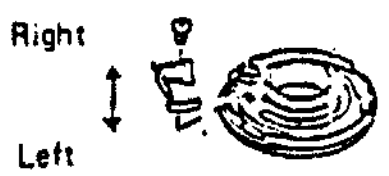
If it stays lit, turn the ± correcting resistors until the ± indicator is extinguished with the CV click set at the right side position. Then, set it at the left side position and make sure that the ± indicator is kept extinguished.

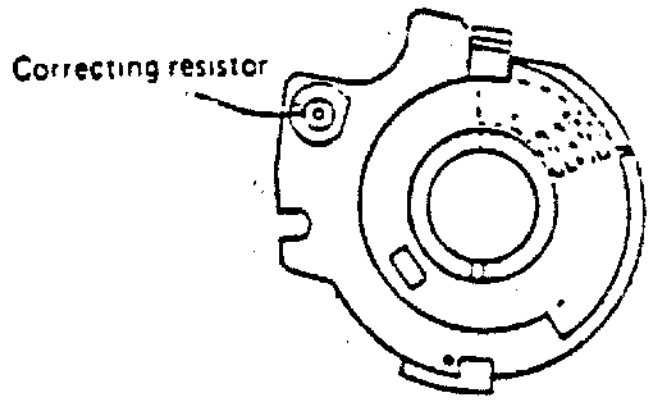
Adjust the ± correcting resistors until the ± indicator is extinguished between the right and left positions of the ± click.

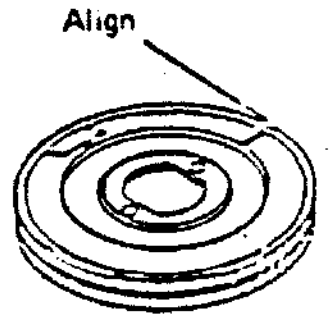
g. After the ± resistors have been adjusted properly, adjust the CV click until the index on the CV dial is set horizontally.

h. Make sure that the ± indicator is lit by turning the CV dial ±1/3 EV.

CV click CE567800







2. TV Adjustment (Manual time)

○ Standard value

1) Power supply voltage: 3.0 ± 0.05V

2) Check points

a. SP 1/8: 117 ± 0 ms

b. SP 1/2000: $0.49^{+0.315}_{-0.037}$ ms

c. Check each manual time to make sure that it is within the standard range.

○ Measuring procedures

1) Power supply voltage: 3.0 ± 0.05V

2) Camera

a. Dismount the lens.

b. Mode: Manual

c. Check point on low speed side: 1/8

d. Check point at high speed side: 1/2000

3) Shutter tester

Set at EXP.

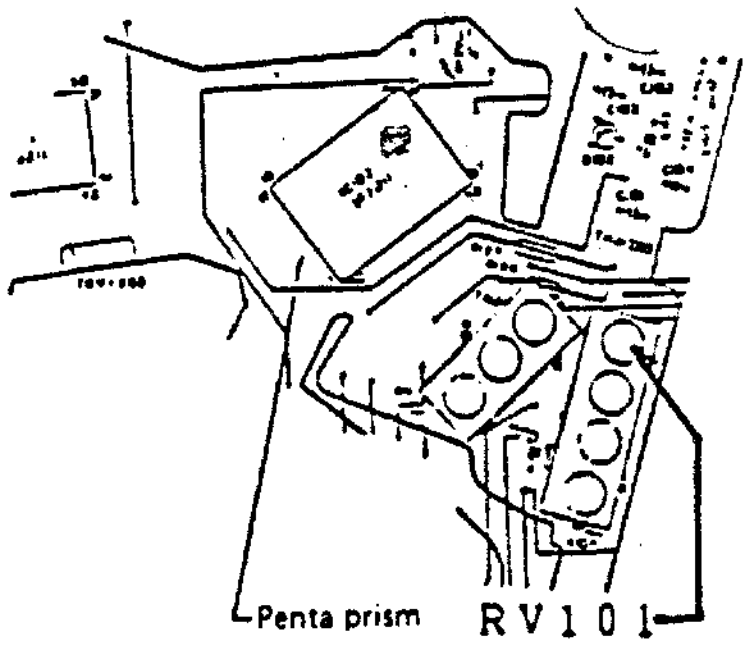
4) Set the camera on the shutter tester.

Wind the film and release the shutter several times.

Check 1/8 sec. to confirm that it is within the standard range.

Then, check 1/2000 sec. to confirm that it is within the standard range.

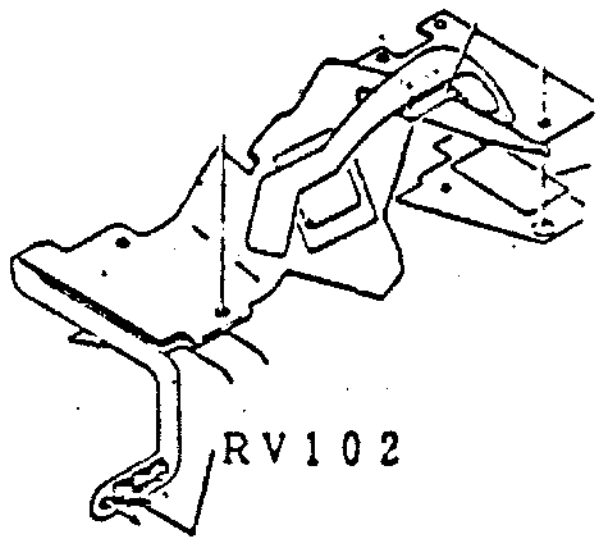
Finally, check each time to confirm that it is within the standard range.



○ Adjusting procedures

1) Adjustment of 1/8 sec.
   Detach the upper plate and turn RV101.

2) Adjustment of 1/2000 sec.
   Detach the upper right part of the front right light wave and turn RV102.



3. EE Adjustment (Direct auto mode)

○ Measuring jig

1) Jig lens

○ Standard values

1) 0 ± 0.05 EV, at BV10, F5.6, ISO 100

2) Check of ISO conversion
   ± 0.4 EV relative to ISO 100 standard at BV7, F5.6, ISO 3200.

3) 0 ± 0.3 EV at BV10, F5.6, ISO 3200

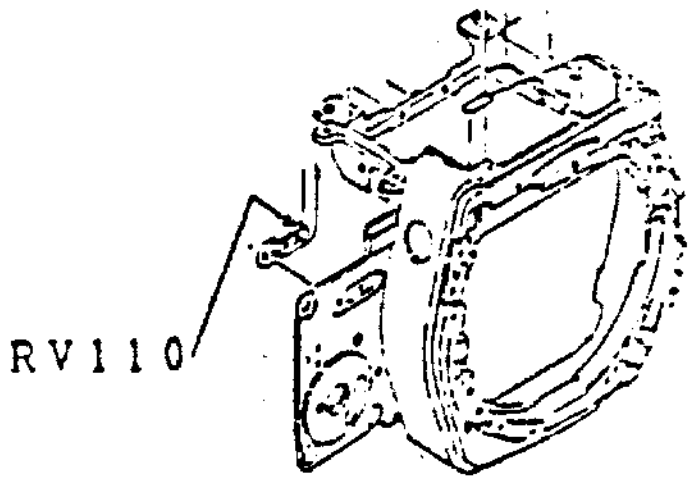
○ Measuring procedures

1) Power supply voltage: 3.0 ± 0.05EV

2) Camera
   a. Mode: Direct auto
   b. ISO: (1) 100, (2) 3200
   c. CV: 0
   d. AV: F5.6

3) EE tester
   a. BV: 10
   b. K value: 1.3
   c. ISO: 100

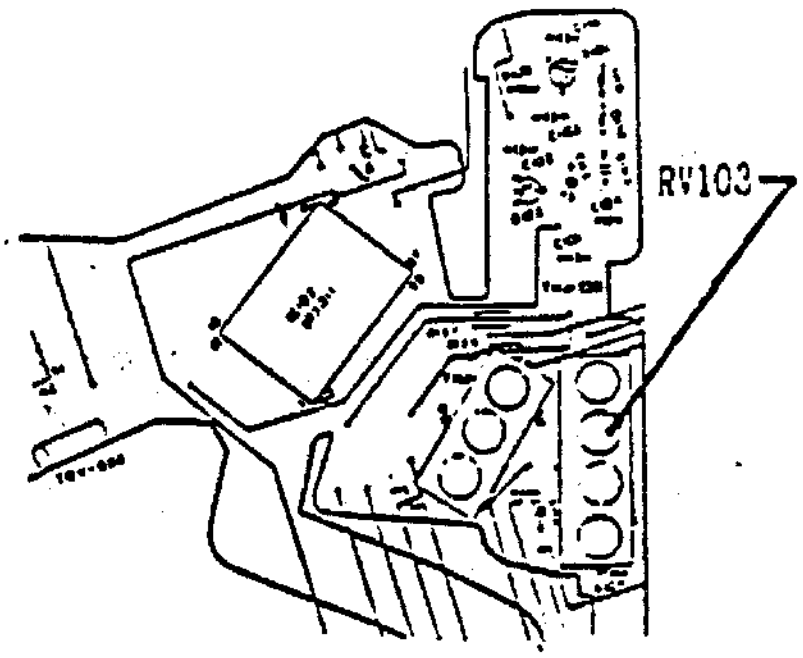
4) Set the camera on the EE tester.
   Wind the film and release the shutter several times.
   Check EE to confirm that it is within the standard range.
   First, check at ISO 100.
   Then, check at ISO 3200.
   Finally check at ISO 3200.



○ Adjusting procedures

1) Adjustment at ISO 100
   Detach the upper right side part of the front right light wave and turn RV110.

2) Adjustment at ISO 3200
   Perform fine adjustment by turning RV103.



4. Adjustment of Indication (BV)

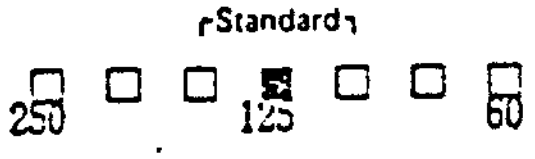
1) Auto Adjustment (average auto mode)

○ Measuring jigs

a. Luminance box
b. Lens (MS5018)
c. VR adjusting wrench

○ Standard value

The bar should be indicated at 1/125 at BV11, F4, ISO 100.



1/125 ± 0.5 EV (±1 segment)

○ Measuring procedures

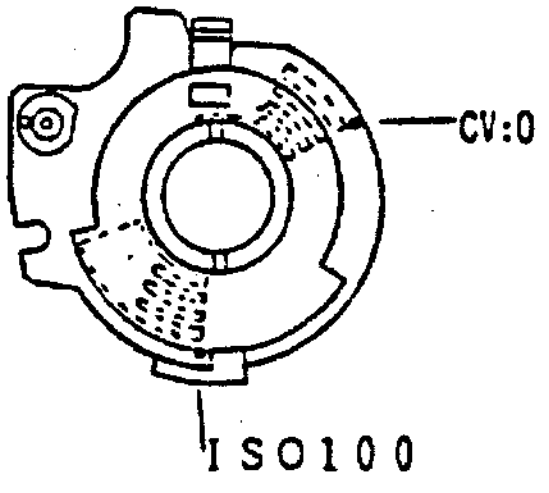
a. Power supply voltage: 3.0 ± 0.05V

b. Camera
(1) Mode: Direct auto
(2) ISO: 100
(3) CV: 0
(4) AV: F4 (jig lens)

c. Luminance box
(1) BV: 11
(2) K value: 1.3

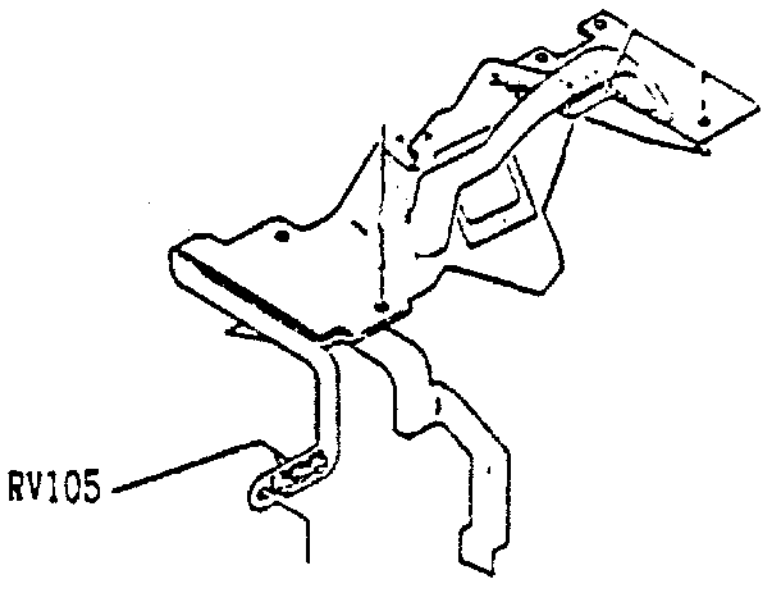
d. Set the camera in the luminance box.
Set the camera in the direct auto mode (SW ON) and observe through the view-finder.
The bar must be indicated within the stadard range.

e. Check BV16 (OVER), 14, 11, 8 and 4 to confirm that they are indicated within the standard ranges.



○ Adjusting procedure

Detach the upper left side part of the front right light wave and turn RV105.



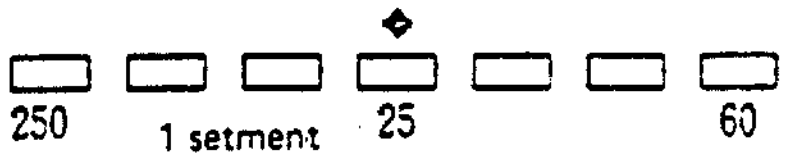
2) Spot adjustment

○ Measuring jigs

a. Luminance box
b. Lens (MS-5018)
c. VR adjusting wrench

○ Standard values

a. The dot must be indicated at 1/125 at BV11, F4, ISO 100.



1/125 ± 1 segment

b. Step formed by switching: ± 0.5 EV

○ Measuring procedures (spot characteristic must be within the standard range)

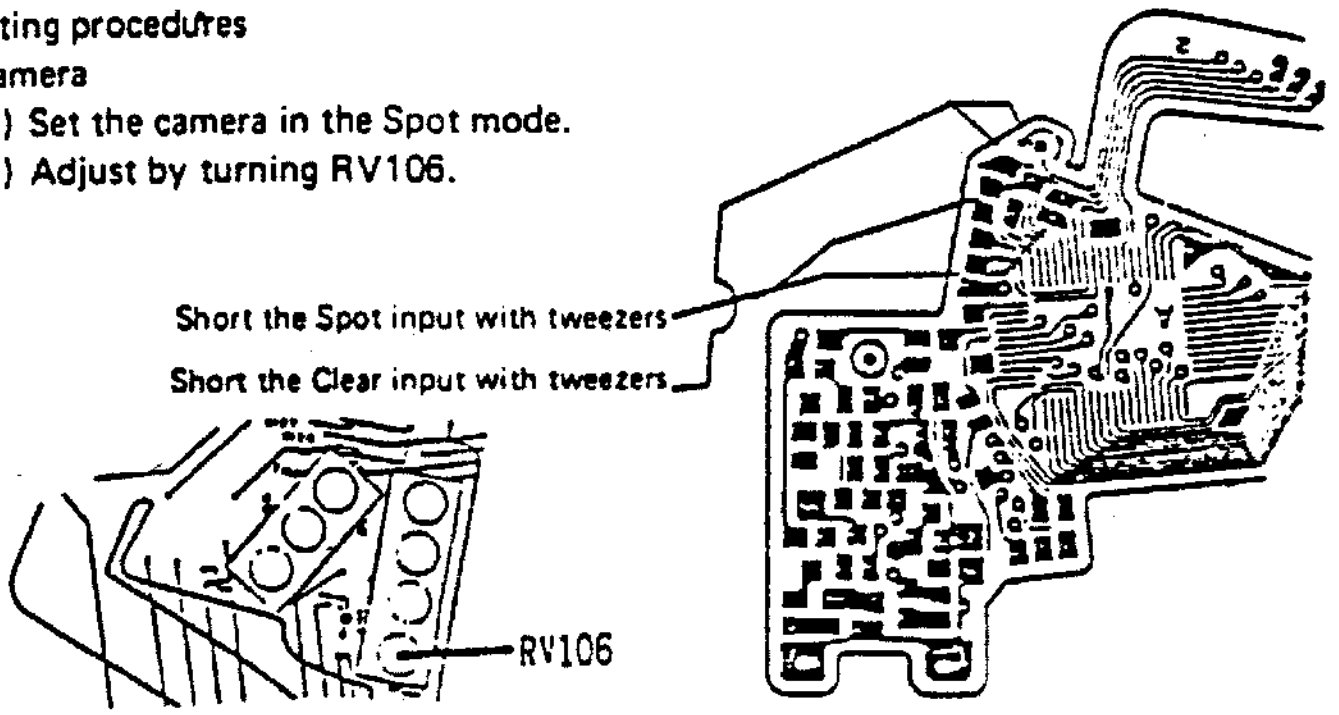
a. Power supply voltage: 3.0 ± 0.05V

b. Camera
(1) Mode: Direct auto
(2) ISO: 100
(3) CV: 0
(4) AV: F4

c. Luminance box
(1) BV: 11
(2) K value: 1.3

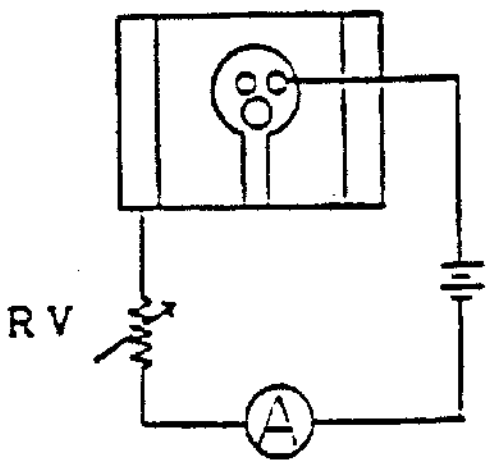
d. Set the camera in the luminance box.
(1) Depress the Spot button
(2) The dot must indicate 1/125 within the standard range.
(3) Check also at BV16, 14, 8 and 4 to confirm that the indications are within the standard ranges.

- Adjusting procedures
  a. Camera
     (1) Set the camera in the Spot mode.
     (2) Adjust by turning RV106.

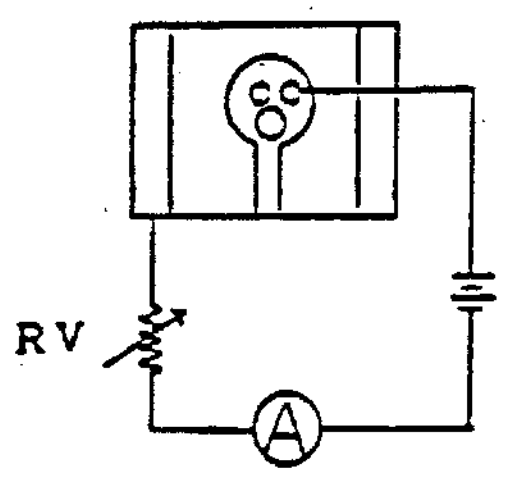


5. Check of Indicator Lamps within Viewfinder

   1) Check of F time switching
   - Form a circuit as shown on the right side. Adjust current by turning the variable resistor.
   - When current of 15 ~ 50 μA is flowed, time must be switched to auto strobe time of 1/60 sec. (SP should be set at about 1 sec. to facilitate the check.)
   - When current of 15 ~ 50 μA is flowed, mark "||60||" must be indicated as a sign of auto strobe time of 1/60 (F time).



   2) Check of strobe charging indication
   - Form a circuit as shown on the upper tight side. At a current level of 150 ~ 500 μA, mark " || " must be indicated on the indicator LED within the viewfinder.

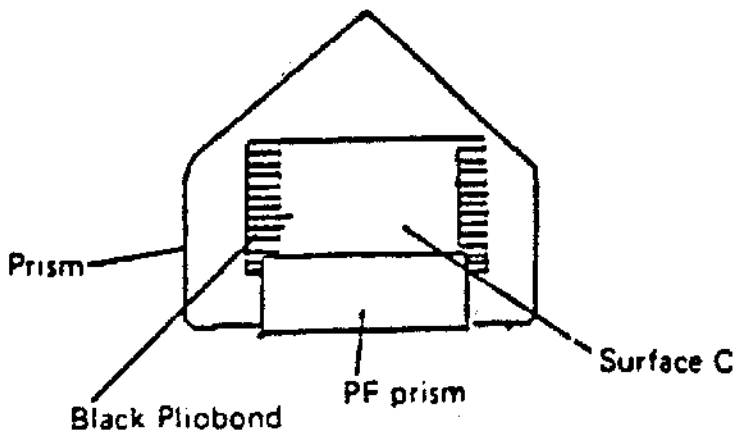


   3) Check of strobe UNDER and OVER indications
   - Check of UNDER indication
     After attaching T20, T32 aor T54 to the camera and turning ON the switch, release the shutter before the charging lamp comes on.
     The UNDER lamp must flicker.
   - Check of OVER indication
     a. Prepare a piece of white film (having reflectance of 95%) and set it in the camera.
     b. Attach T20, T32 or T45 and turn ON the switch. Release the shutter after the charging lamp comes on.
     The OVER lamp must flicker.

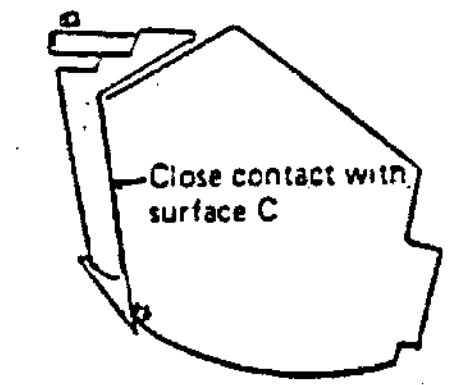
VII. REASSEMBLY AND ADJUSTMENT OF INDICATOR ILLUMINATOR

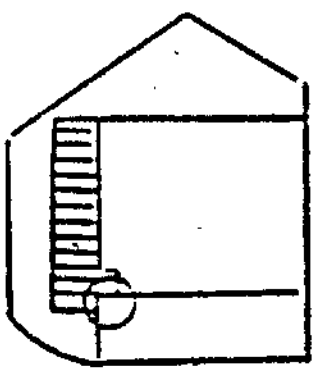
1. Reassembly of PL Base Unit

1) Apply black Pliobond to the mounting surface (surface of prism C) for PL Holder 1 CE547100.



2) Mount and bond the PL holder 1 onto the black Pliobond.
- o It must be brought into close contact with the surface C.
- o Both the sides of the PF prism must be in contact with the bonded surface of the PL holder.



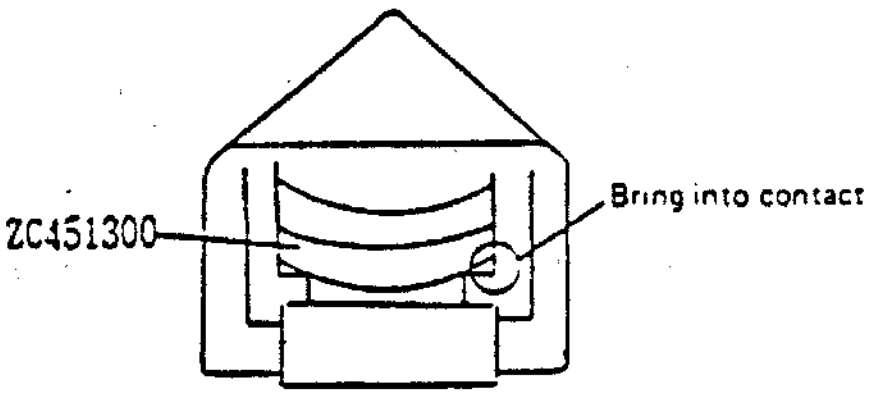


Bring into contact with PL prism.

3) Bonding relay lens
- o Apply black Pliobond to surface C of the prism to which Relay lens ZC451300 is to be bonded.
- o Mount and bond the relay lens to the black Pliobond.

The relay must be brought into close contact with the surface C.

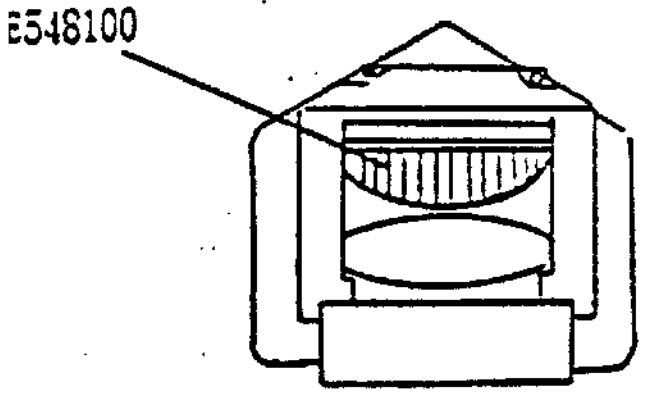
Bring the relay lens contact with the surface of the PL holder 1 as shown on the right side.



4) Bonding of P light proof
- o Bond P Light proof CE598100 to the relay lens.

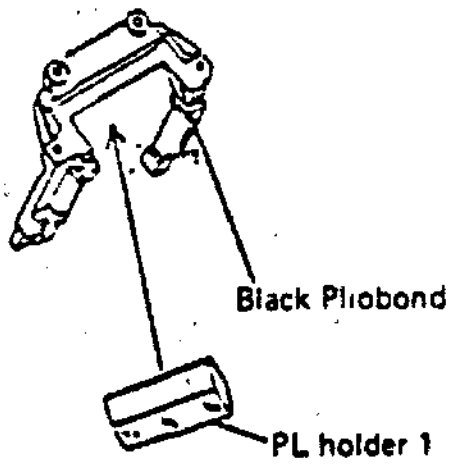
The P light proof must be brought into close contact with surface C.

It must not eclipse the light beam between the HL prism and relay lens.



5) Bonding of HF prism
- o Apply a small amount of black Pliobond to both the sides of the top of the PL holder 1.
- o Direct the coated surface of HF Prism LC420500 deeper downward and bond the prism to the PL holder 1.

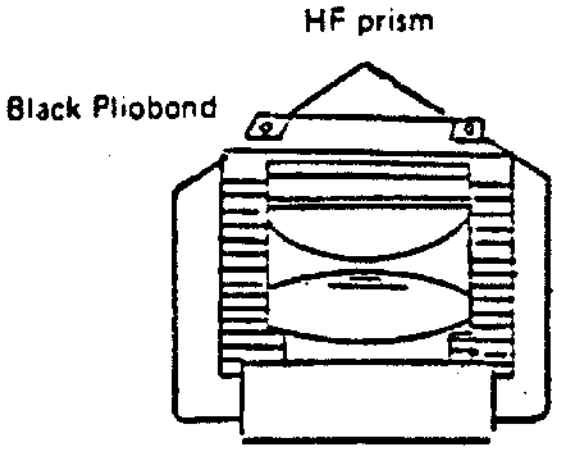
Bring the bottom transparent surface into contact with the PL holder 1 and bond the prism in such a position that the top transparent surface is set horizontally.



6) Bonding of PL light proof (1)

- Apply black Pliobond to two spots on the PL holder 1 and a spot on the relay lens.
- Bond PL Light proof CE542800 between the bottom surface of the HF prism and top surface of the PF prism.

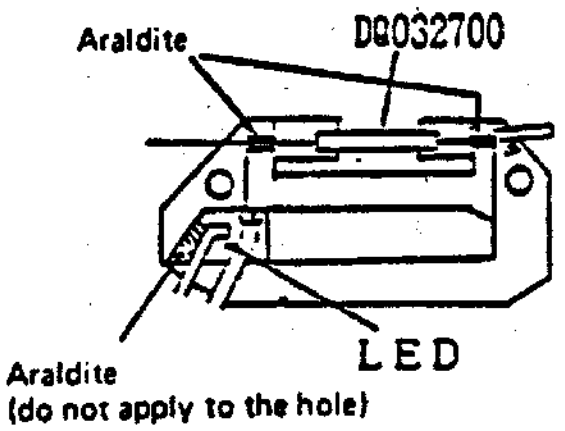
mzmzmz



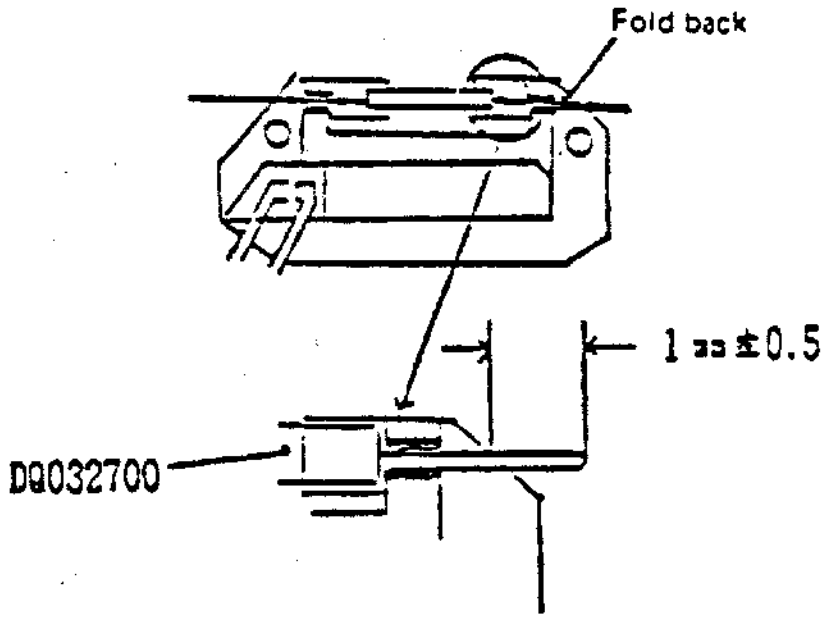
Reassembly and Adjustment of K Prism

1) Reassembly of lamp

- Set Lamp DQ032700 in the lamp setting groove of K Prism ZC451500 and fit the lamp lead wires into the right and left grooves.
- After the lamp has been set in position, fix it by applying Araldite at two spots on its right and left sides.



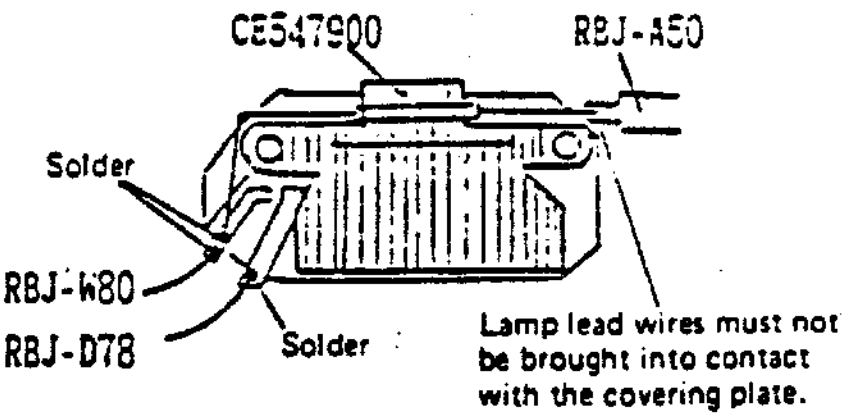
- Since the lamp feet are weak, fold back the soldered part of RBJ-A as shown below.



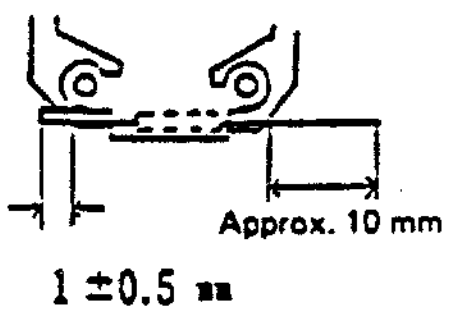
2) Reassembly of covering plate

- Fit Covering plate CE547900 over the K prism.
- Solder RBJ-D78, RBJ-A50 and lamp lead wires at the positions shown below.

*The soldering works must be done quickly. Note that Araldite and K prism are easily affected by heat.



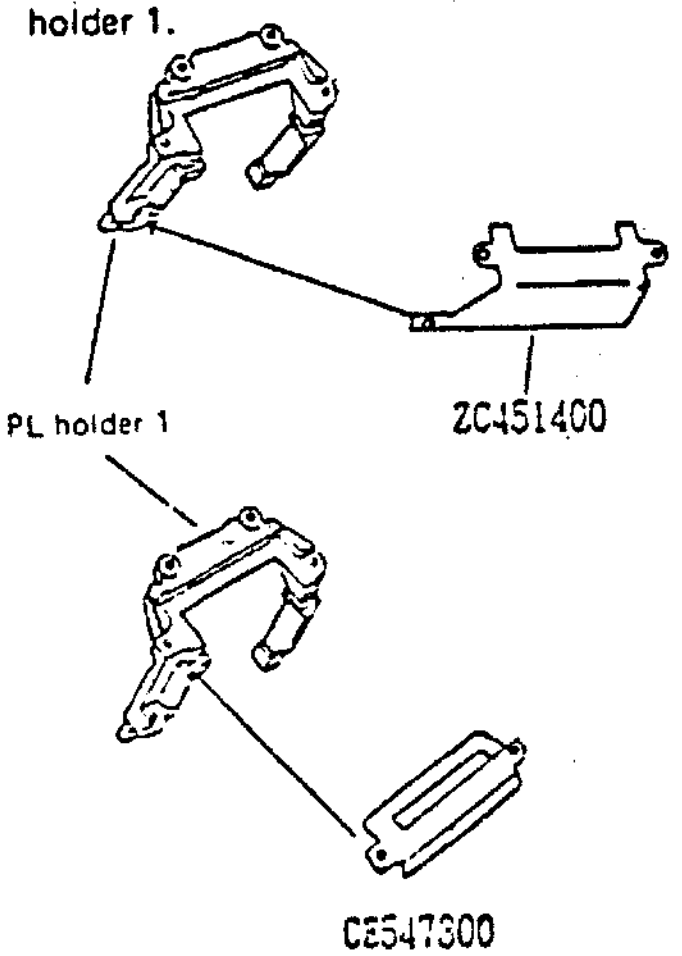
- The lamp lead wires should have the length shown below.



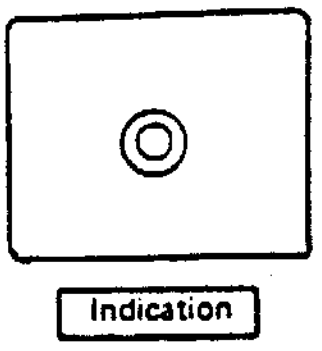
3. Reassembly and Adjustment of L Circuit Board, LCD and K Prism

1) Fix L Circuit board ZC451400 to the PL holder 1 with Screw 3PUTB1.4x2.5SN.

2) Mount PL Plate CE547300 on the PL holder 1.

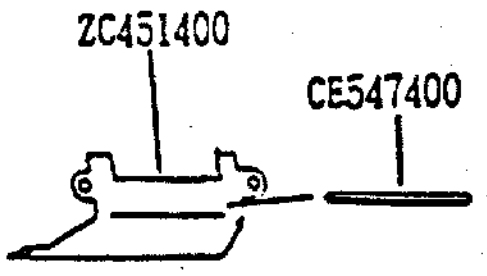


○ The indication must be visible on the lower surface of the mask free from vignetting or inclination.
The indicator lamp must not be remarkably injured or inclined.



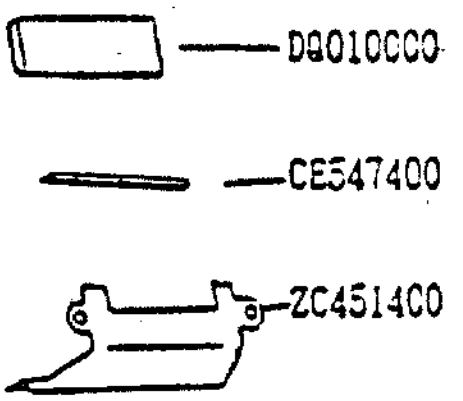
3) Mount Rubber connector CE457400 on the contact of L circuit board.

○ The rubber connector must not deviate from the pattern LCD on the L circuit board.



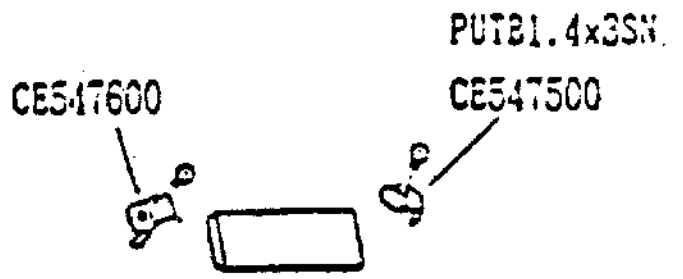
4) Mount LCD DD010000 on the rubber connector.

○ The liquid crystal cell surface (coated surface) should be set upside with the glass surface kept underside.



5) Mount L Stopper L CE547500 and L Stopper CE547600 on both the sides of LCD DD010000. Fix the stoppers with two Screws PUTB1.4x3SN.

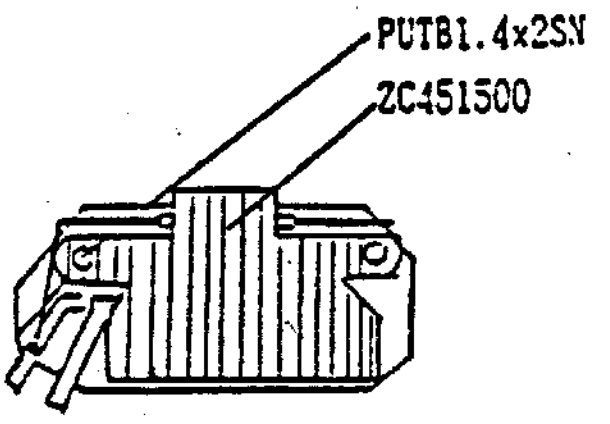
○ The stoppers must be fixed so as not to incline the indicator lamp.



6) Place K Prism ZC451500 on the LCD and fix it by tightening Screw PUTB1.4x2SN.

○ The LED lead wire must be set above.

7) After reassembling the indicator lamp in ignited condition, make sure that all the LCDs can be lit, and position them correctly. Finally fix them by tightening the two setscrews (PUTB1.4x3SN) on the L stoppers L and R.



VIII. TIMING ADJUSTMENT OF SW BASE PLATE

1. Adjustment of U Switch (Contact 1)

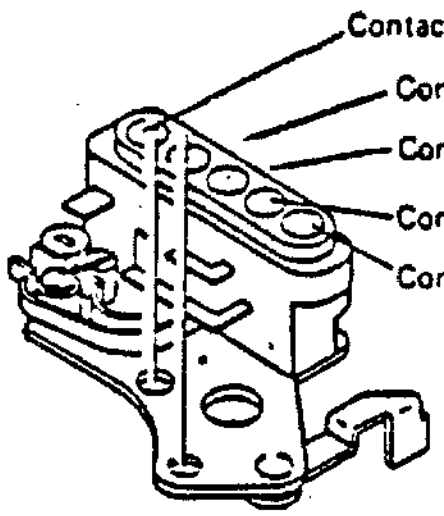
   1) The gap between the tips of Lock plate ZC452000 and SW Plate ZC452500.

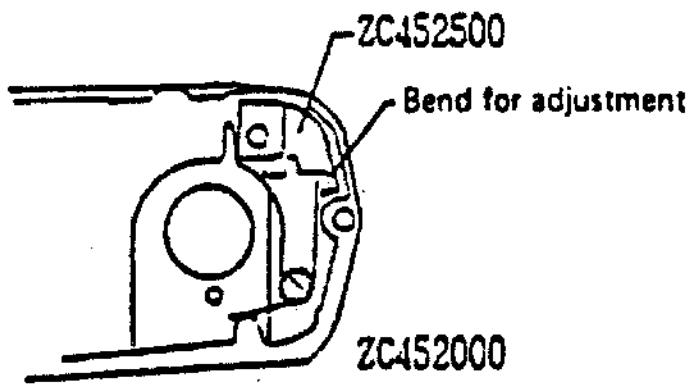
   2) Gap between rear cover and lock plate
   The U switch must not be turned OFF when the gap is 2.2 mm or wider.

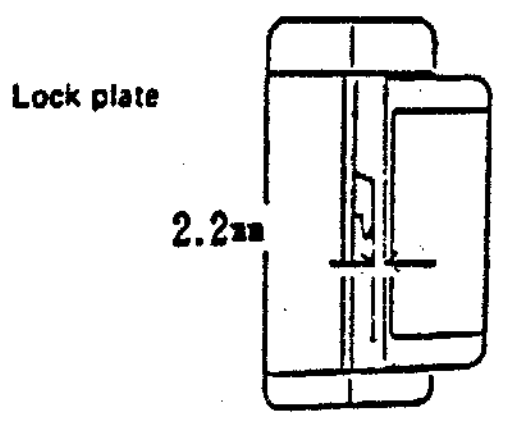
   3) When the rear cover is opened, contact 1 must be shorted to the body.

   4) When the rear cover is closed, contact 1 must be disconnected from the body.

   5) For the timing; bend the tip of SW Plate ZC452500.







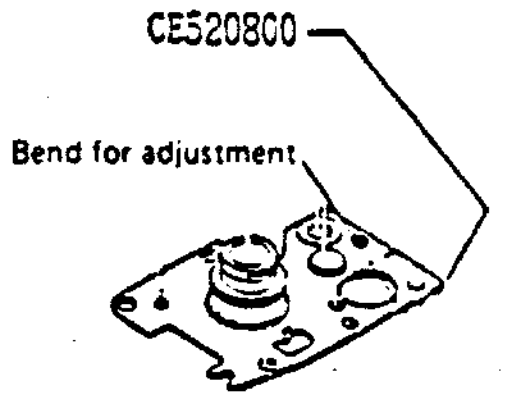
2. Adjustment of RK Switch (Contact 4)

   1) When RK Button CE561200 is set, contact 4 is shorted to the body.

   2) When the RK button is released, contact 4 must be disconnected from the body.

   3) For adjustment, bend Lock spring CE-520800.

   4) Make sure that the switch can be normally turned ON and OFF by loading and unloading a tentative film twice.

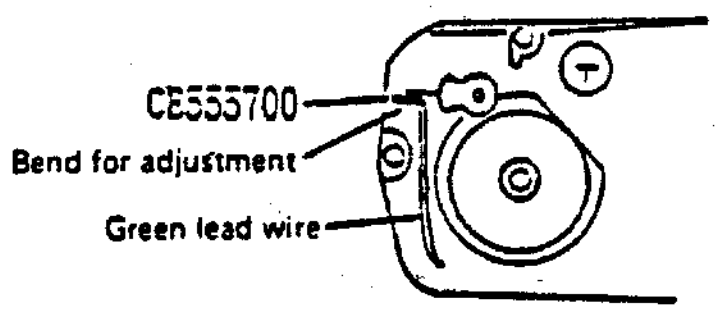


3. Adjustmnt of SF Switch (Contact 5)

   1) When the film is loaded contact 5 must be shorted to the body.

   2) When the film is unloaded, contact 5 must be disconnected from the body.

   3) For adjusting the SF switch, bend SF Plate CE555700.



4. Adjustment of MD Switch

1) Adjustment of brake timing (contact 2)

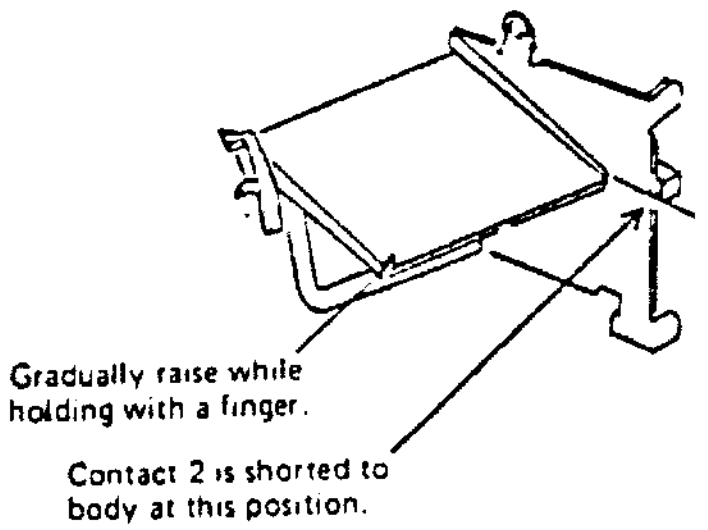
a. Wind the film.

b. While holding the lower end of the mirror with a finger, release the shutter.

c. Gradually raise the mirror.

d. When the top surface of the mirror reaches the lower end of the diaphragm lever, contact 2 must be shorted to the body.

e. For adjusting the brake timing, move the positioning pin (without tube).



2) Adjustment of winding timing (contact 3)

a. Wind the film.

b. mzmzmz

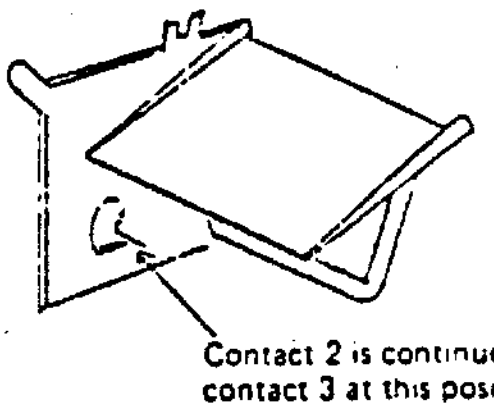
c. Release the shutter.

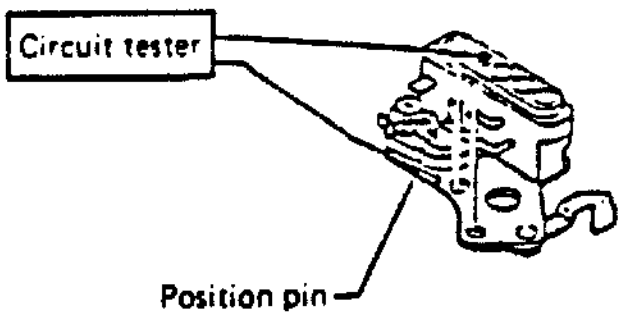
d. Lower the KM lever gradually while holding it with a finger.

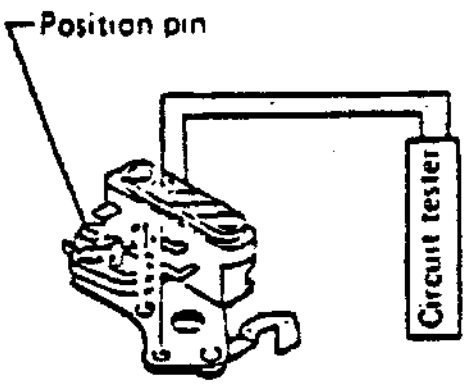
e. When the mirror is lowered until it is brought into contact with P Plate CE-542000 (for 45° positioning), contact 2 must be continuous to contact 3.

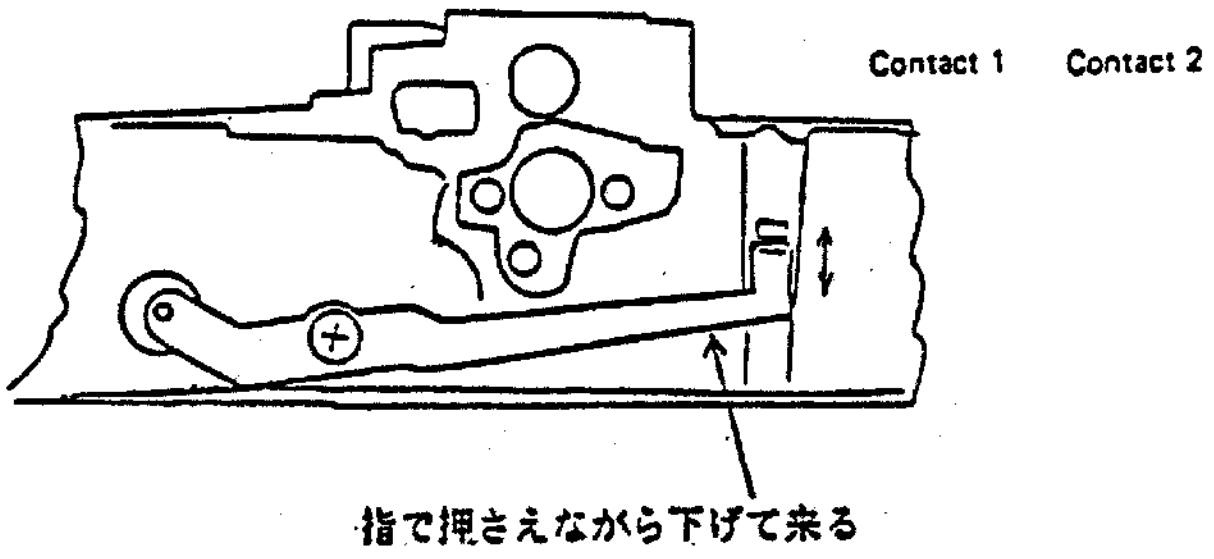
f. For adjusting the winding timing, move the positioning pin (with tube).

g. Contacts 1 and 2 must not be shorted simultaneously.



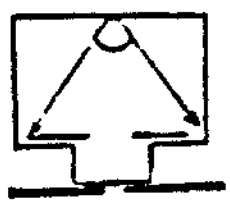






IX. CHECK AND ADJUSTMENT OF SPOT CHARACTERISTIC (POSITION OF SUB MIRROR)

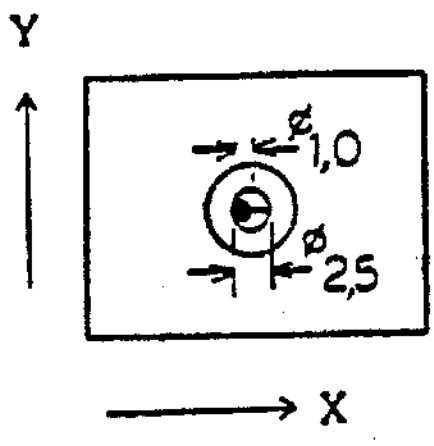
1. Checking Procedures of Spot Characteristic
   - o Attach lens MS5018 to the camera and set it on the tripod.
   - o Place a piece of black paper (30 cm x 30 cm having a hole about ϕ10) in the luminance box light source.
     Use BV12 ~ 15 as the light source (surroundings should be kept dark).
   - o Bring the camera into focus on the light source. Move the camera to and from the luminance box until the image of the light source has a size of ϕ1 on the screen.
     (ϕ1: Approximate diameter of split part)
   - o Set the camera in the Spot mode and locate the light source image ϕ1 within the split part. While observing the indication within the viewfinder and inclining the camera in the X and Y directions, check whether or not the photosensor element exhibits the maximum sensitivity.



Luminance box

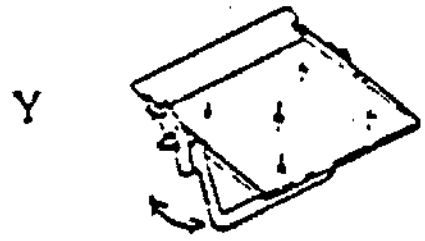
Black paper

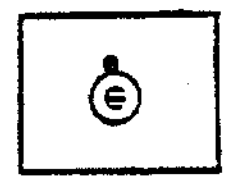
OM.4



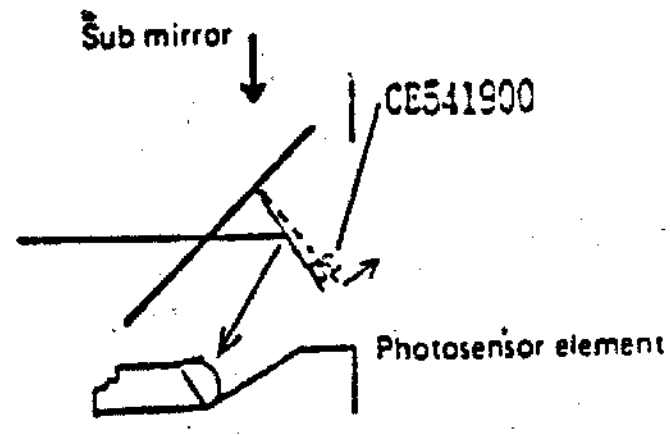
2. Adjustment of Spot Position
   When position of the spot is deviated, correct it by varying the stop position of the sub mirror.
   - o Positioning in Y direction
     With the shutter kept open, vary stop position of the sub mirror by bending P Lever CE-541900.
     When the stop position is remarkably deviated, separate the front casting unit and varying the position of the P lever.

     Example: When position of the spot is deviated upward on the screen, shift stop position of the sub mirror toward the mask (to prolong the optical path length).
   - o Positioning in X direction
     The sub mirror is calked to Main mirror ZC-450600 and cannot be adjusted independently. Therefore, it should be readjusted taking optical path length of the viewfinder into consideration.





Position of spot



3. Wiring of Old and New M and L Circuit Baords
M Circuit board ZC451700 and L Circuit board ZC451400 have patterns different from those on the M and L circuit boards currently used. When a circuit board is replaced with the new one, it is therefore necessary to add and remove wires and external attachment parts.

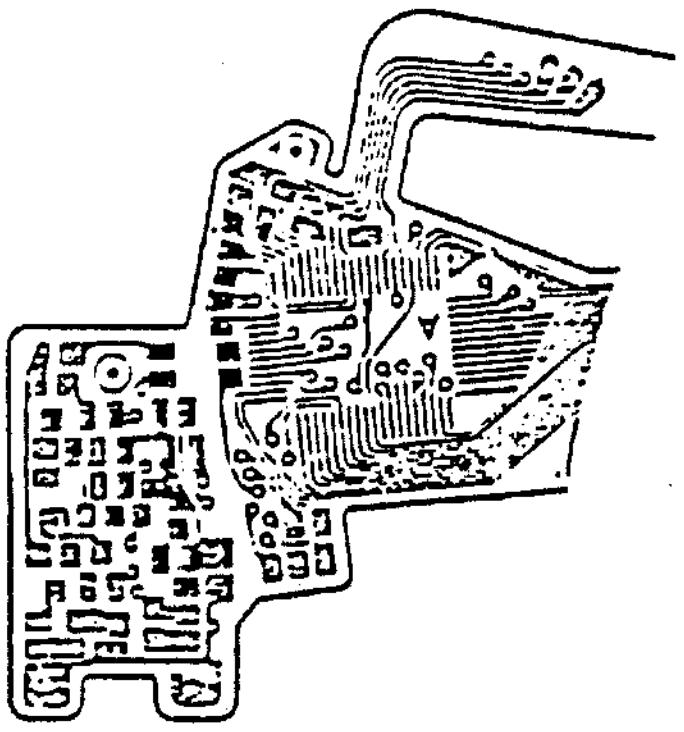
1) Adoption of new circuit board
Camera manufactured in November, 1983 adopted the new M circuit board in combination with the old L circuit board.
Subsequently, the new L circuit board was adopted in combination with the new M circuit board.

2) Combinations of the circuit boards
   a. Old M circuit board and old L circuit board
   b. Old M circuit board and new L circuit board
   c. New M circuit board and old L circuit board
   d. New M circuit board and new L circuit board

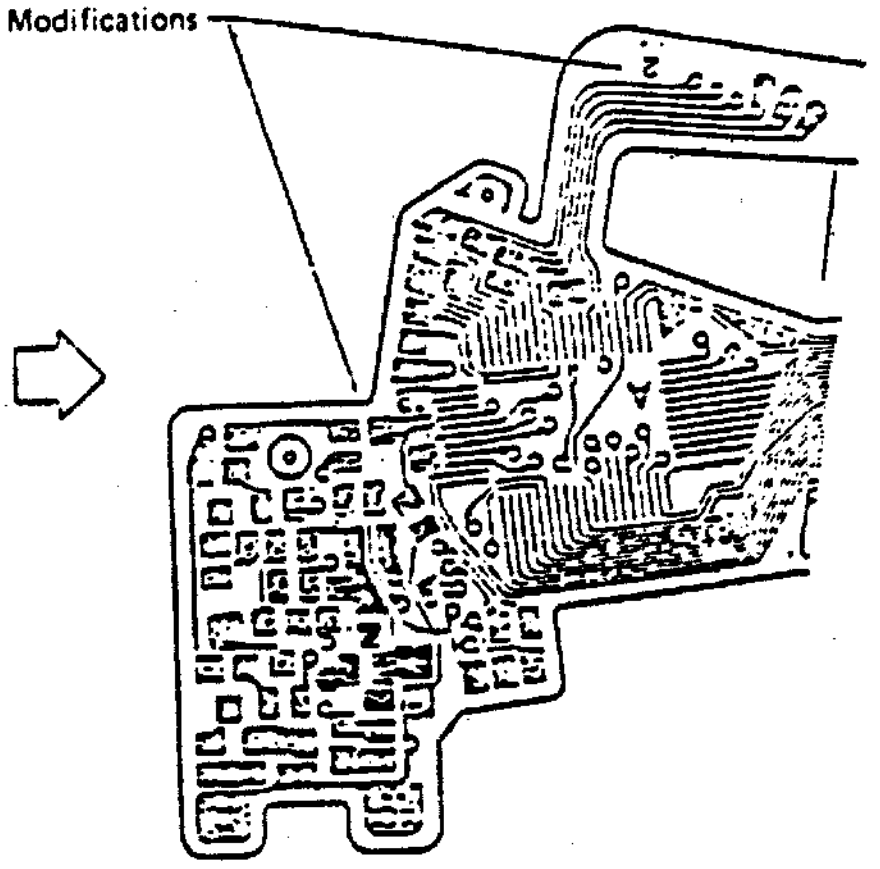
   These combinations are interchangeable when parts are added and removed.

3) Modifications
   M circuit board:
   R129, R130 and R132 used as external parts of the old circuit board were modified into patterns on the new circuit board.
   L circuit board:
   R306 and R307 used as external parts of the old circuit board were modified into patterns on the new circuit board.

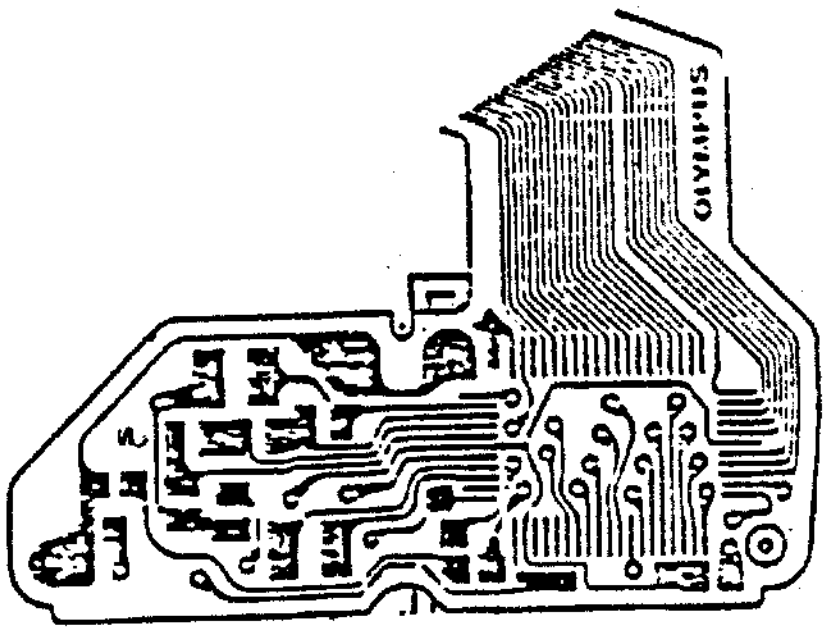
M circuit board (old)



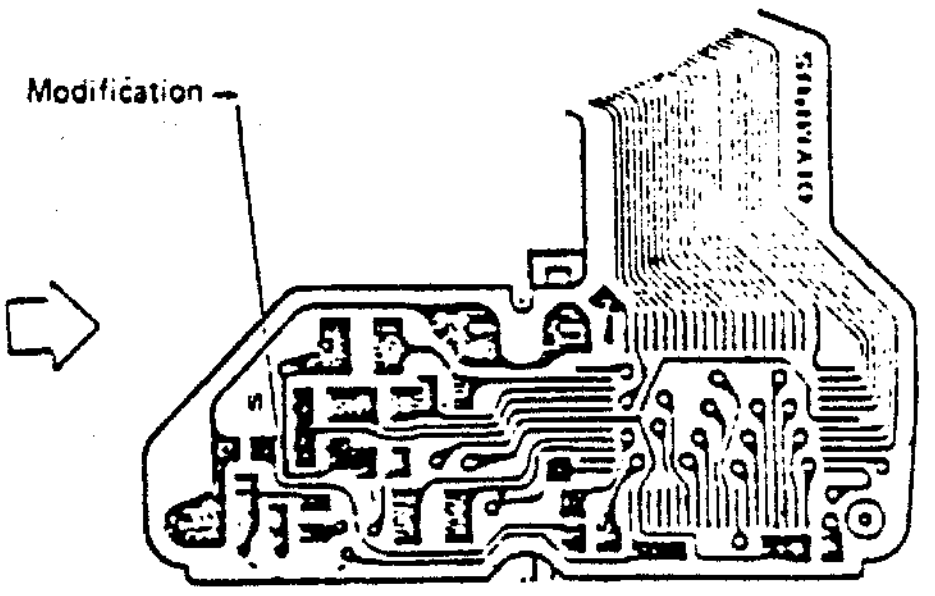
M circuit board (new)



L circuit board (old)



L circuit board (new)

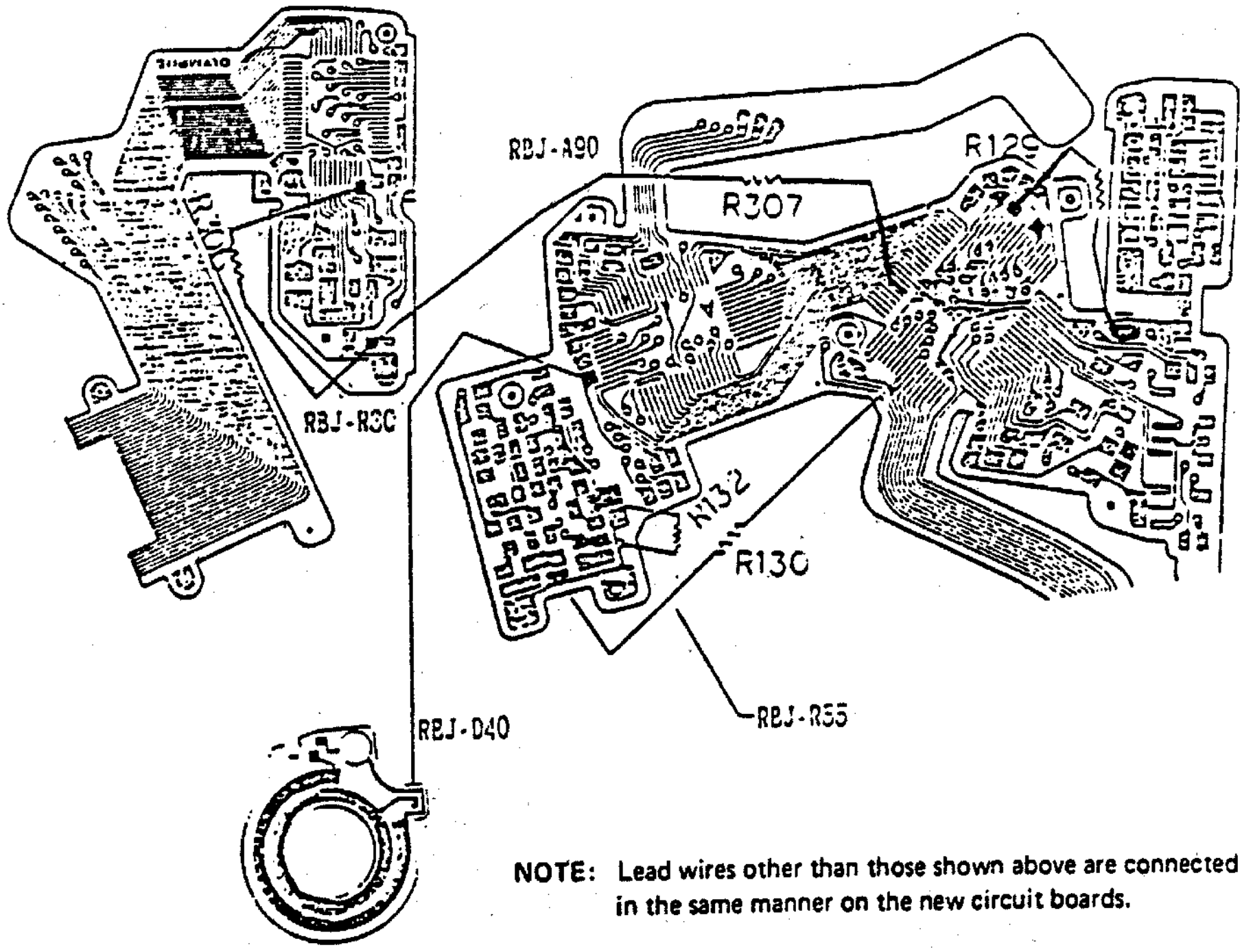


4) Wiring and connection of resistors

1. Combination of old M circuit board and old L circuit board

Old L circuit board

Old M circuit board

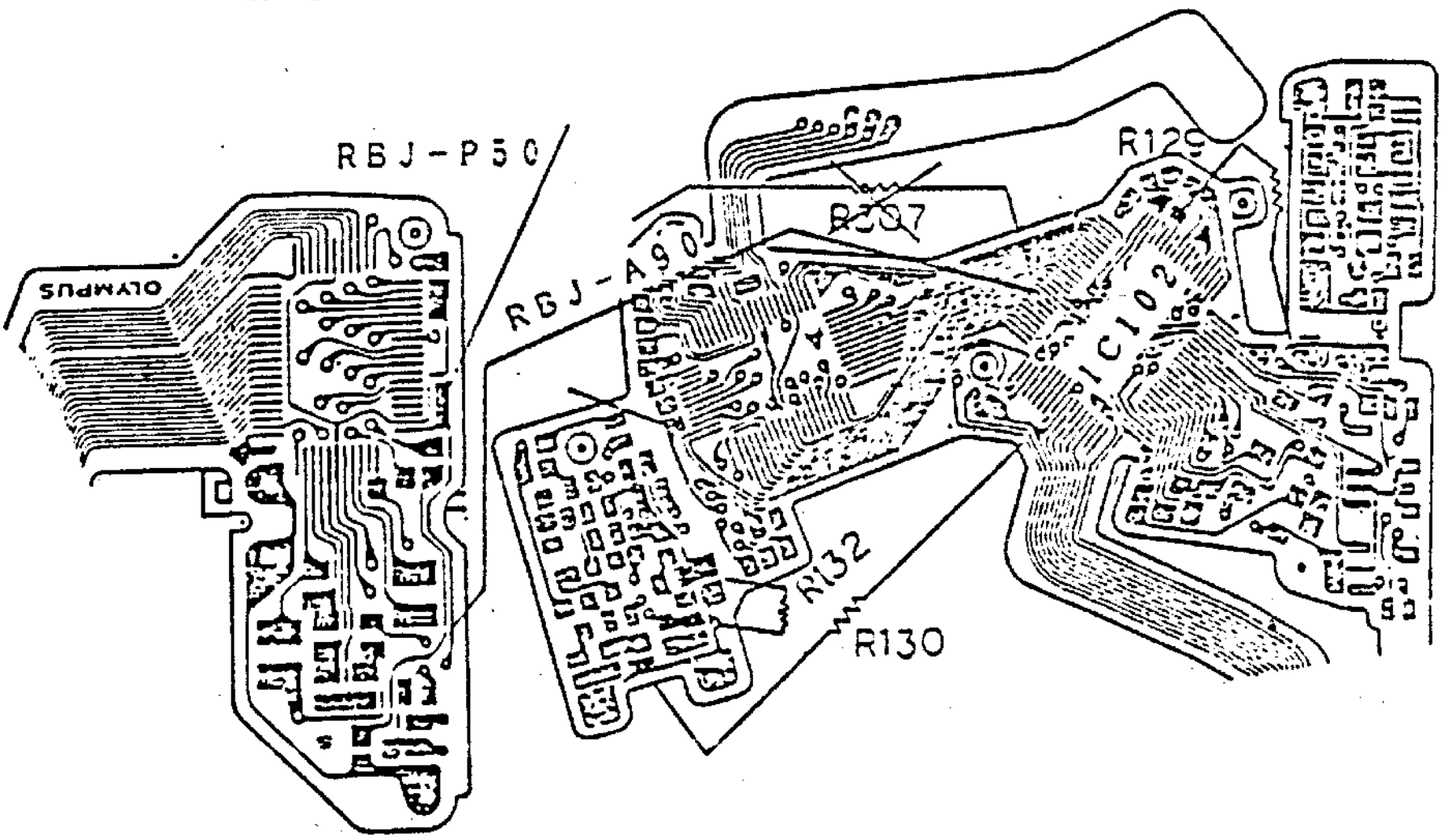


NOTE: Lead wires other than those shown above are connected in the same manner on the new circuit boards.

2. Combination of old M circuit board and new L circuit board
   - Disconnect RBJ-P50 and R307.
   - Solder RBJ-A90 or G90 to terminal No. 26 of IC102 (bipolar) and solder the other end to R307 rand on the L circuit board.

New L circuit board

Old M circuit board



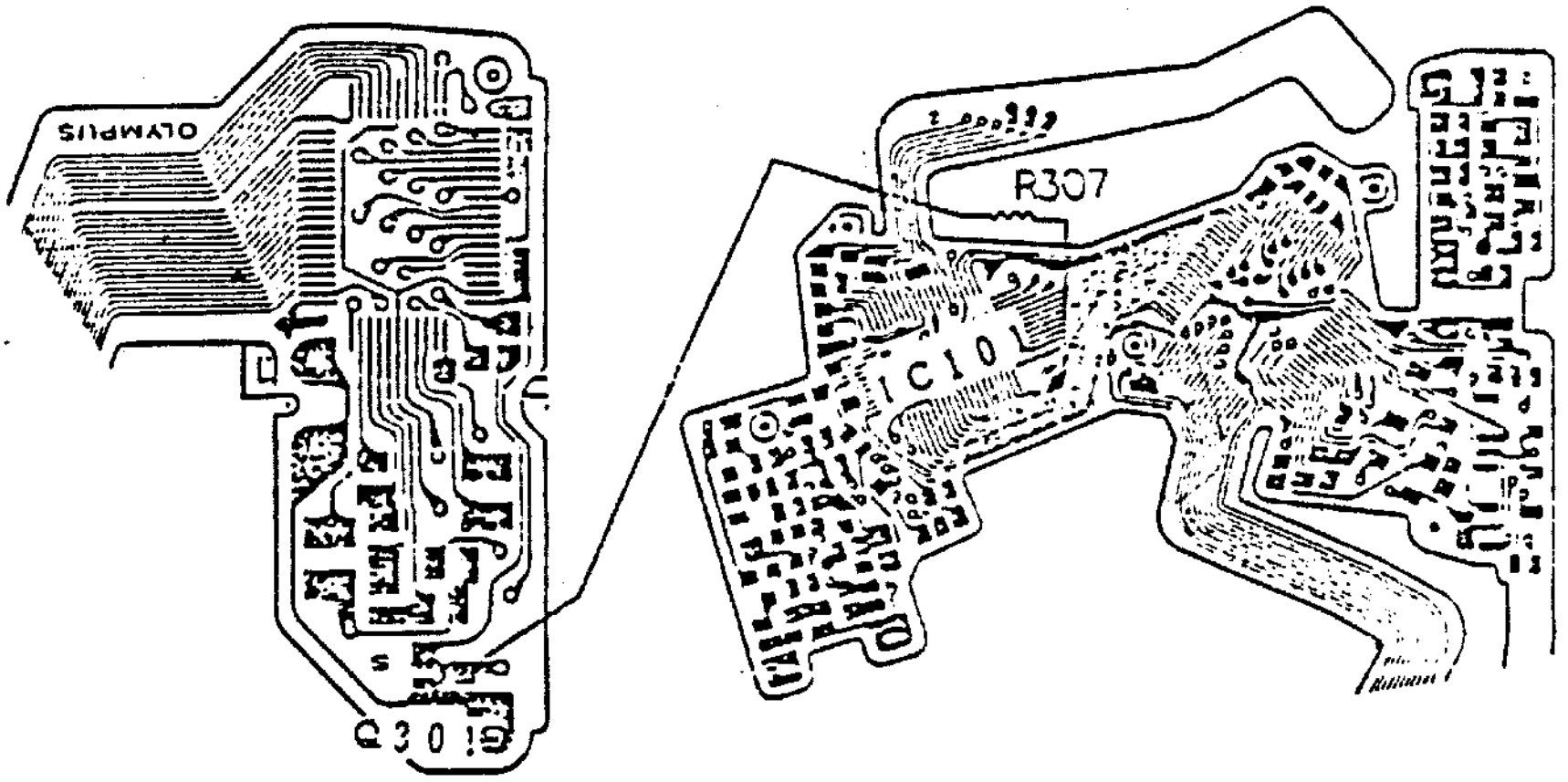
3. Combination of new M circuit board and new L circuit board
   - Refer to the wiring diagram contained in manual No. A-4.

4. Combination of new M circuit board and old L circuit board

c Solder R307 (330 kΩ) chip resistor to terminal No. 52 of IC101 (CPU). Solder one end of RBJ-G75 to R307 and the other end to collector of Q301.

Old L circuit board

New M circuit board



NOTE: Connections of the lead wires other than those shown above remain unchanged.

E. REPAIRING PROCEDURES

CONTENTS

I. SYMBOLS FOR ELECTRIC CIRCUIT AND REMARKS ..... E- 1
II. CHECK POINTS OF CIRCUIT BOARD ..... E- 3
1. M Circuit Board ..... E- 3
2. RS Circuit Board ..... E- 5
3. L Circuit Board ..... E- 5
4. CE Circuit Board ..... E- 5
5. TV Circuit Board ..... E- 6
6. (M Circuit Board) Head Amplifier unit ..... E- 6
7. Layout of Electric Parts ..... E- 7
III. INPUT AND OUTPUT VOLTAGES OF ELECTRIC CIRCUIT E-10
1 Power Supply Circuits E-10
1-1 Mode Switching Circuit E-10
1-2 Bipolar Power Supply E-13
1-3 LCD D Power Supply E-15
2. Oscillator Circuit E-17
3. LCD D Circuit E-18
4. LCD E-23
5. Reference Voltage and Current Circuits E-24
6. CV & SV Circuit: EE Adjusting Circuit E-25
7. TV & AV Circuit E-27
8. BV Level Converter Circuit E-29
9. Head Amplifier E-30
10. DAC Circuit E-33
11. Reset Circuit and Flash Misjudgement Preventive Circuit E-36
12. MG1 Drive Circuit E-39
13. Trigger Drive Circuit E-40
14. Head Amplifier (Exposure) E-41
15. MG2 Drive Circuit: High-Speed Limiter E-42
16. Regeneration Time Circuit E-43
17. Trigger Data Latch Circuit E-44
18. MG1 Charging Circuit E-45
19. Flash Control Circuit E-46
20. Light Control Circuit E-47

21. Flashing Circuit ..... E- 48
22. Over/Under Exposure Circuit ..... E- 50
23. B.C. Circuit ..... E- 51
24. Self-Timer Circuit ..... E- 53
IV. TROUBLESHOOTING OF ELECTRIC SYSTEM ..... E- 55
1. Diagnosis Flow Chart ..... E- 55
2. Troubleshooting Flow Charts ..... E- 56
2-1 Electric System Inoperative ..... E- 56
2-2 LCD Indication Abnormal ..... E- 58
2-3 Shutter Locked ..... E- 72
2-4 Shutter Left Open ..... E- 78
2-5 Shutter Speed Too High ..... E- 80
2-6 Flash Circuit Defective ..... E- 82
2-7 Auto EE Adjustment Abnormal ..... E- 85
2-8 Regeneration Time Abnormal ..... E- 86
2-9 Malfunction of B.C. System ..... E- 87
2-10 Self-Timer Inoperative ..... E- 87
2-11 LED Abnormal ..... E- 88
2-12 PCV Defective ..... E- 91
2-13 Reset Function Abnormal ..... E- 92
2-14 Reference Voltage Vref Abnormal ..... E- 93
2-15 DAC Adjusting Circuit Defective ..... E- 94
2-16 ± Correction Adjustment Abnormal ..... E- 94
3. Troubleshooting: Check Procedures ..... E- 95
3-1 Electric System Dead ..... E- 95
3-2 LCD Indication Abnormal E-104
(1) No Item Displayed E-104
(2) All Items Indicated E-120
(3) Indication Unreliable E-121
(4) Some Items Not Indicated E-126
(5) Bar Indication Not Provided E-135
(6) Bar Indication Always OVER E-139
(7) Bar Indication Unchanged with Data Input E-142
(8) Bar Indication Flickers E-148
(9) Head Amplifier or Related Part Defective E-151

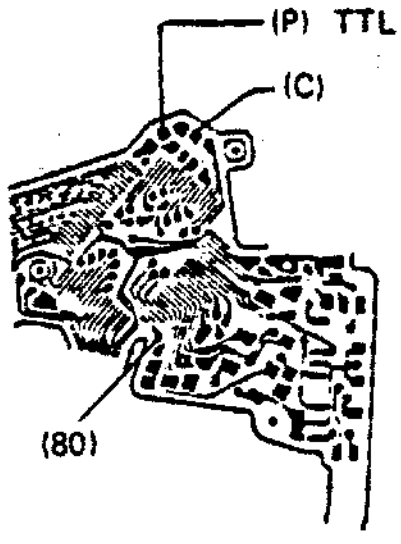
3-3 Shutter Locked E-162
(1) Diagnosis with Synchroscope E-162
(2) Shutter Locked in AUTO and MANUAL Modes E-167
(3) Shutter Locked in AUTO Mode E-174
(4) Shutter Locked in MANUAL Mode. E-174
3-4 Shutter Left Open E-175
(1) Shutter Left Open in AUTO and MANUAL Modes E-175
(2) Shutter Left Open in AUTO Mode E-178
(3) Shutter Left Open in MANUAL Mode E-178
3-5 Shutter Speed Too High E1-79
(1) Shutter Speed Too High in AUTO and MANUALModes. E-179
(2) Shutter Speed Too High in AUTO Mode. E-183
(3) Shutter Speed Too High in MANUAL Mode E-185
3-6 Flash Circuit Defective E-186
3-7 EE Adjustment Abnormal. E-193
3-8 Regeneration Time Abnormal E-194
3-9 Malfunction of B.C. System E-195
3-10 Malfunction of Self-Timer. E-196
3-11 LED Not Light E-197
3-12 PCV Defective. E-199
3-13 Reset Circuit Defective E-200
3-14 Reference Voltage Vref Abnormal E-201
3-15 DAC Adjusting Circuit Defective. E-202
3-16 Misadjustment of +— Compensation E-203

I. SYMBOLS FOR ELECTRIC CIRCUIT AND REMARKS

1. Symbols for Lead Wires and Leg No. of IC

(1) (P) and (C) shown on the right side represent colors of lead wires.
(2) GND represents ground.
(3) (80) represents leg No. of IC.

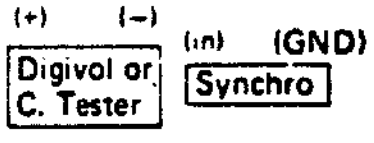
Symbol	Color of lead wire	Symbol	Color of lead wire
A	Blue	K	Light green
B	Black	M	Purple
C	Brown	P	Pink
D	Orange	R	Red
G	Green	W	White
H	Gray	Y	Yellow



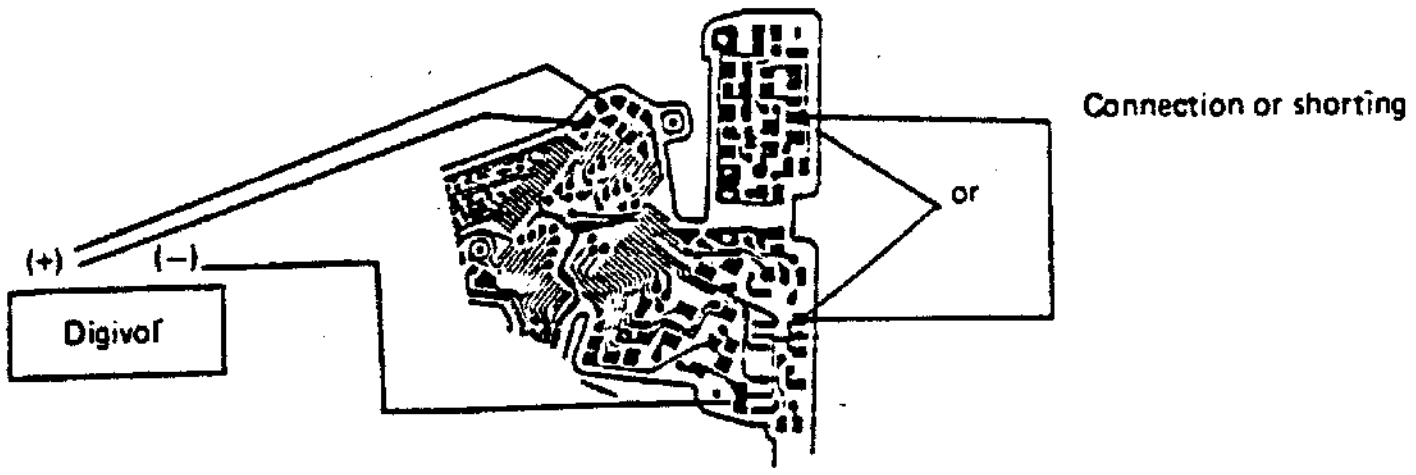
: (P) and (C) represent colors of lead wires

2. Symbols for Measuring Instruments

(1) A digital voltmeter is expressed as "Digivol".
(2) A DC range is represented by DC [ ] or [ ] DC.
(3) A resistance range is expressed as Ω [ ] or [ ] Ω.
(4) A synchroscope is expressed as "Synchro".
(5) "+", "−", input and GND terminals of a measuring instrument are expressed as respectively.



(6) Connection and shorting are illustrated as shown below.



(7) The two wires leading from the (+) side of the measuring instruemnt are not connected to the same point. With the (−) side fixed, bring the (+) side tester rod into contact with the patterns indicated by the two lines respectively and read measured values on the patterns respectively.
For simplicity of illustration, only one measuring instrument is traced.

3. Indications of Voltage and Resistance Values

(1) Voltage and resistance are indicated in approximate values.
(2) H and L generally represent 3 V and 0 V.
However, this does not apply to transistors. Since 0.6 V is sufficient between base and emitter, L may represent 2.4 V at a location where a transistor is used.
(3) Signal between CPU and Bipolar IC generally represent H = 0.5V and L = 0V except POWER, HA and HB signals.

(3) A digital voltmeter or synchroscope should in principle be used for measuring voltages.
- A circuit tester often reads lower voltages.
- When a circuit tester reads a voltage remarkably different from a reference voltage, it should be checked with a digital voltmeter or synchroscope.

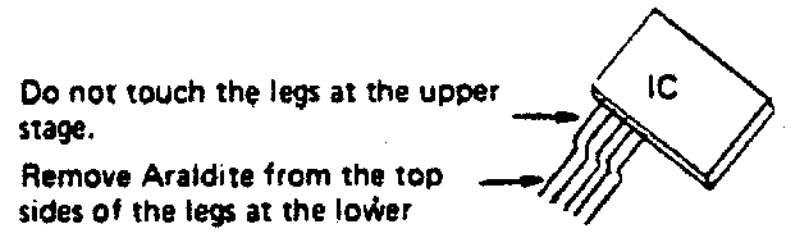
(4) Do not flow a high current to an IC for continuity check with a circuit tester.

4. Check Sequence

Checks for troubleshooting should in principle be carried out in the sequence given in the manual. However check of IC legs are tedious and may be carried out last.

5. Procedures to Check IC Legs

(1) Check tips of IC legs by using a thin needle-like rod of a circuit tester.
(2) Remove Araldite from the IC leg carefully.



6. Troubleshooting (Electric System)

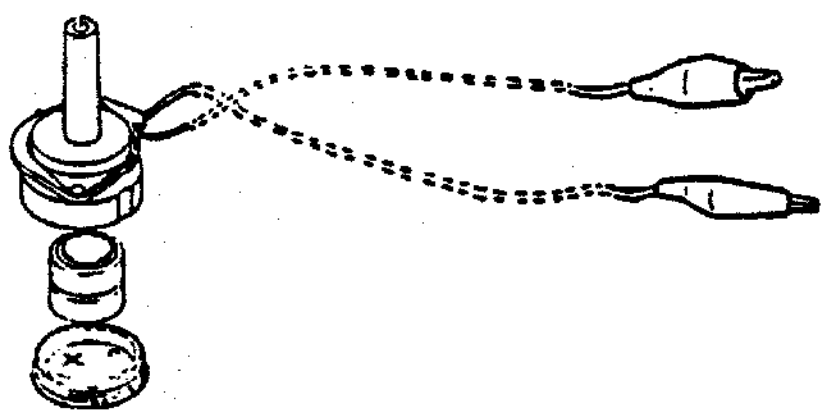
(1) Checks for troubleshooting should in principle be carried out in the sequence given in this manual.
(2) Troubleshooting of the electric system is carried out on a premise that the mechanical system is normal. Be sure to confirm beforehand that the mechanical system is normal.
(3) Troubleshooting is carried out on a premise that the lead wires are connected correctly. Confirm beforehand that the lead wires are connected correctly.
(4) When troubles occurs simultaneously at two or more locations, troubleshooting becomes a time-consuming task. Carry out troubleshooting patiently.
(5) A trouble may be traced to a cause which is not mentioned in this manual. In such a case, add the symptom and cause in this manual for later reference.

7. Remarks on Troubleshooting

(1) Troubles frequently traced to defective soldering of IC legs and other parts.
(2) The servicing personnel should check especially for breakage of patterns as well as connection between front and rear circuit boards.
(3) Lead wires may be broken or shorted when they are caught between the top plate and front plate.
(4) In attaching the top plate, take care not to crush the lead wires.

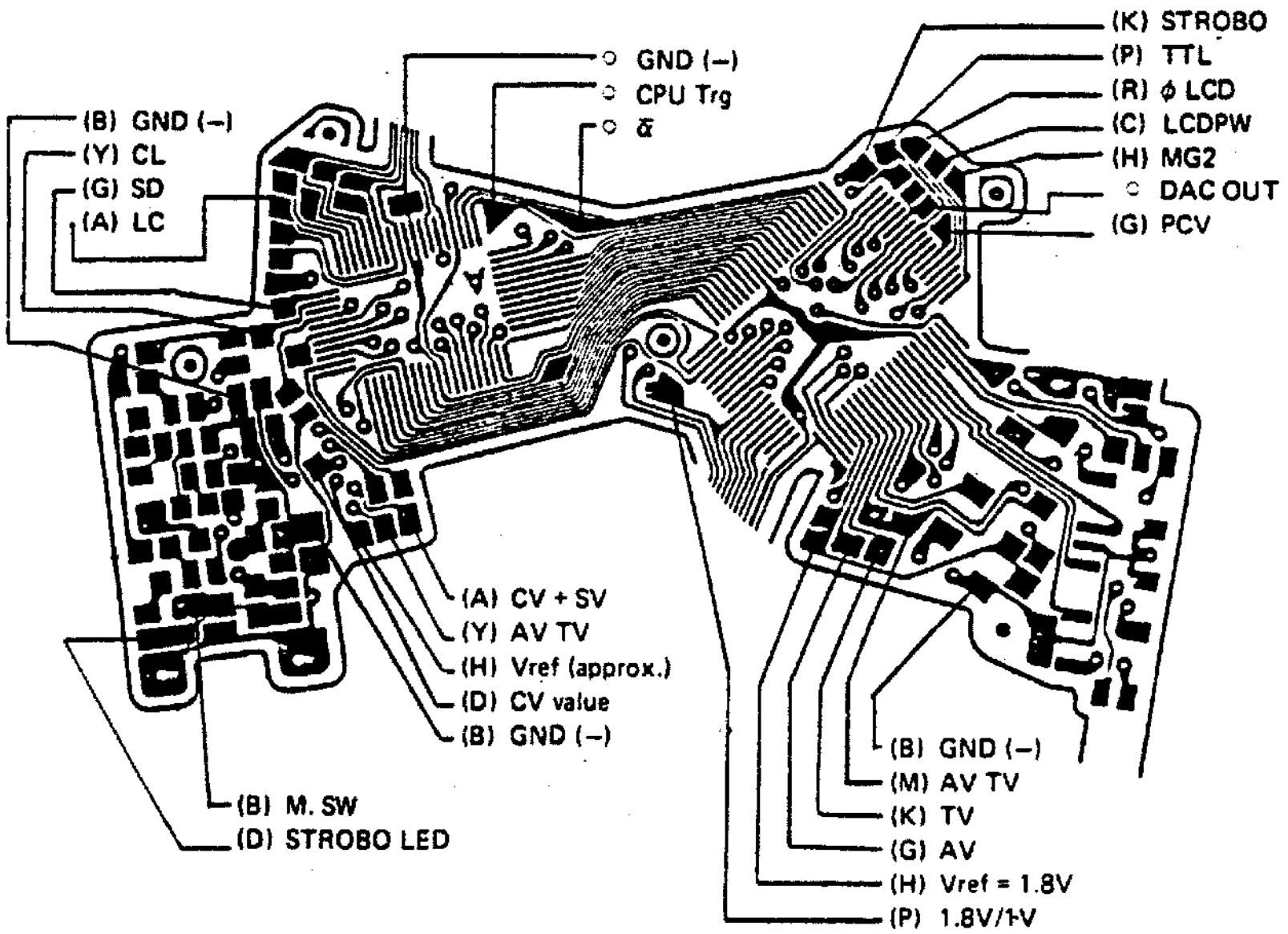
8. Others

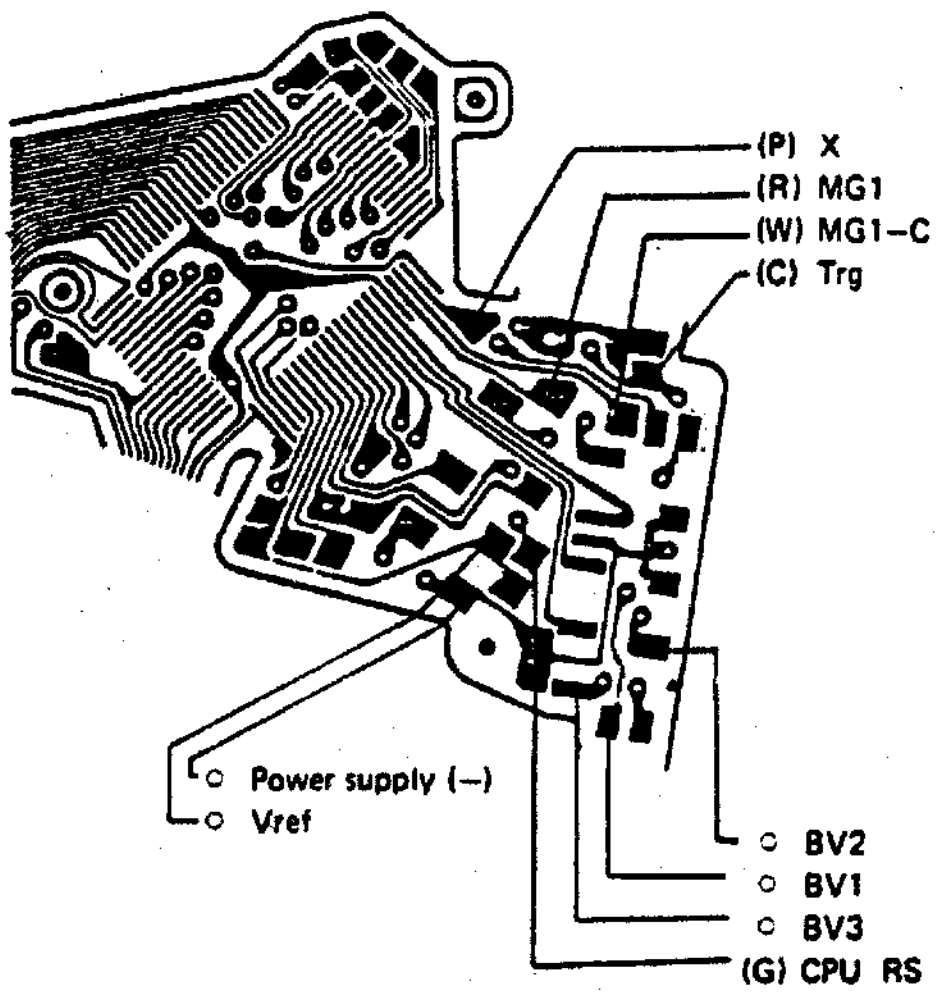
(1) "IC defective" means defect of IC proper.
(2) "IC leg defective" and "resistor defective" include defective soldering.
(3) "Lead wire broken" and "resistor broken" include defective soldering.
(4) "C902 (–)" and "C101 (+)" represent the (–) side of C902 and (+) side of C101 respectively.
Prepare a jig battery by utilizing Battery case (ZJ144700 or ZJ155200) and Battery case lid (CE215700) of OM-10. Solder red and black lead wires of suitable length to the positive and negative terminals of the battery case, and solder alligator clips to the other ends of the lead wires.



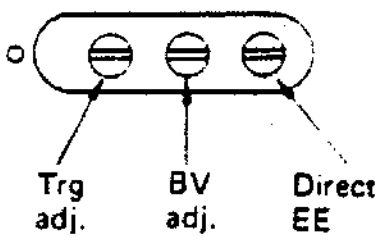
II. CHECK POINTS OF CIRCUIT BOARDS

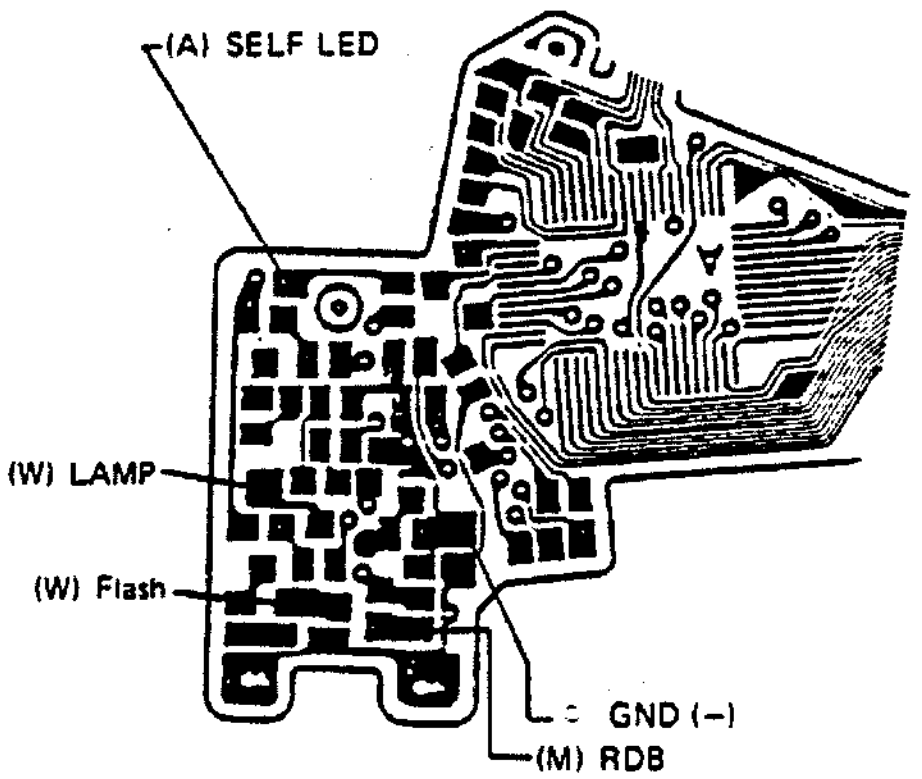
1. M Circuit Board



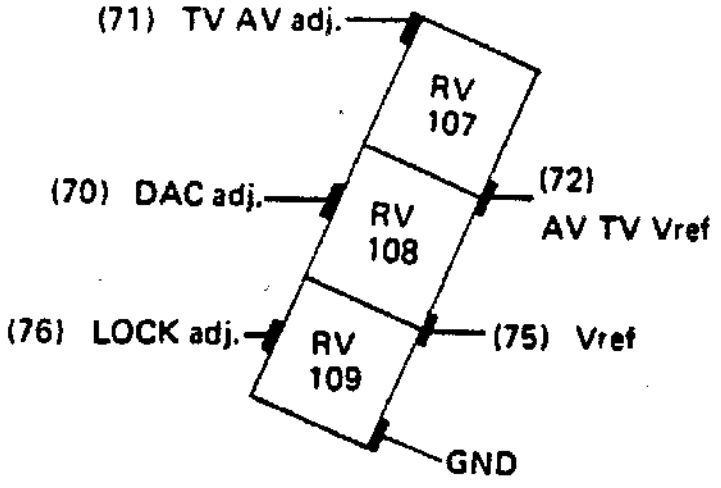


Front Plate Unit



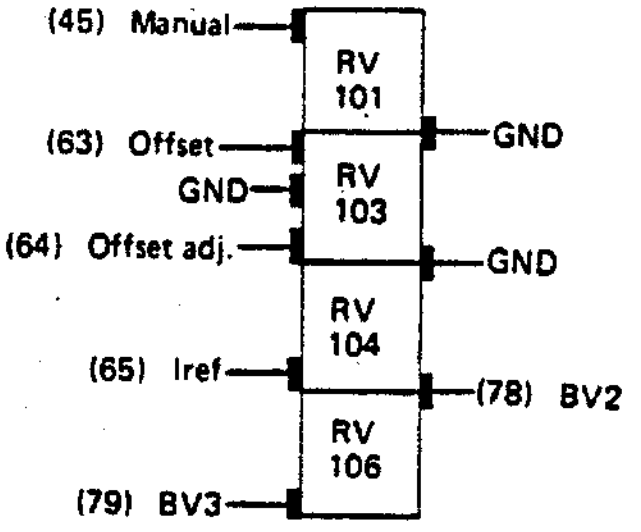


Triple Resistors



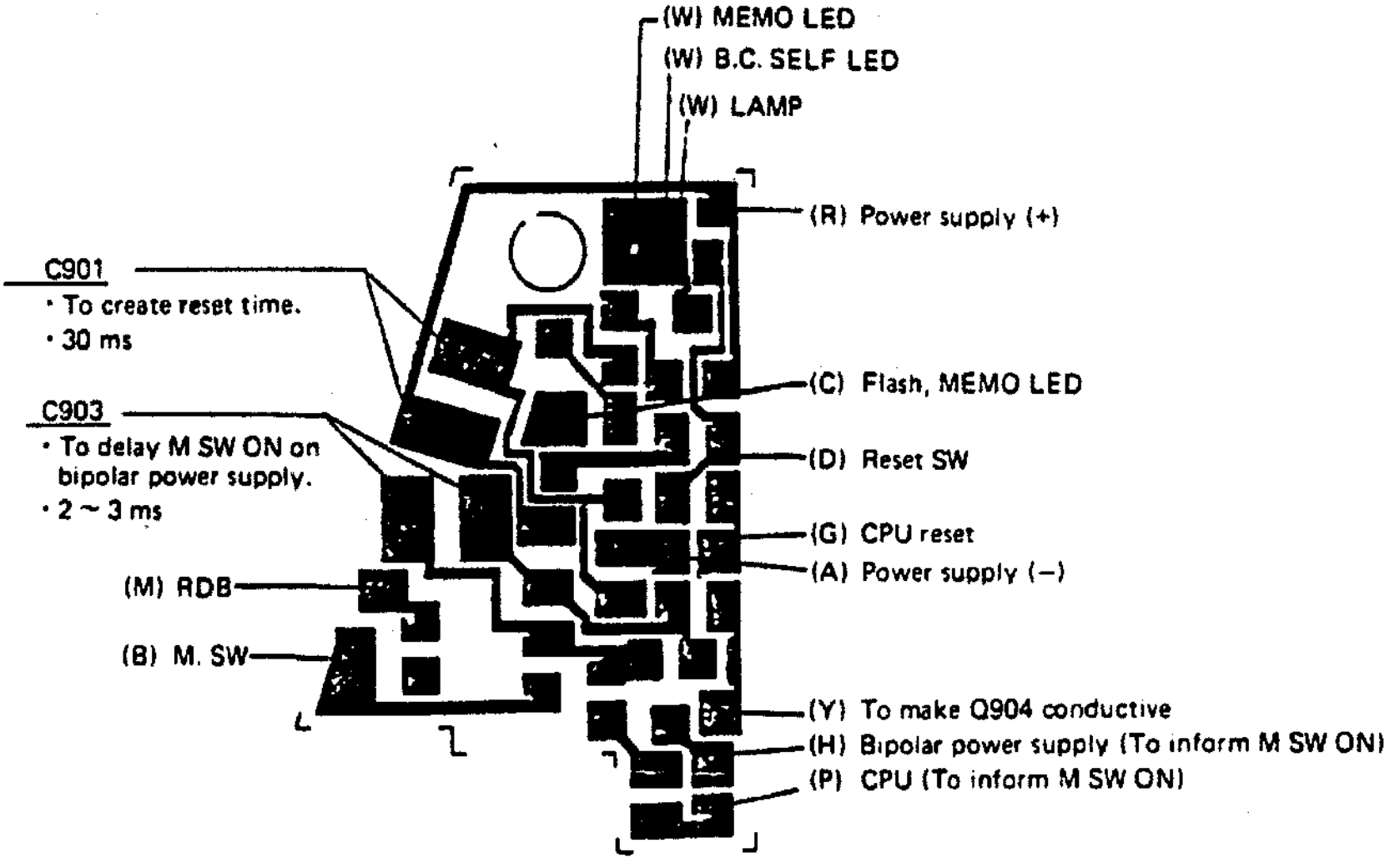
RV107: TV AV adj.
RV108: DAC adj.
RV109: LOCK adj.

Quartette Resistors

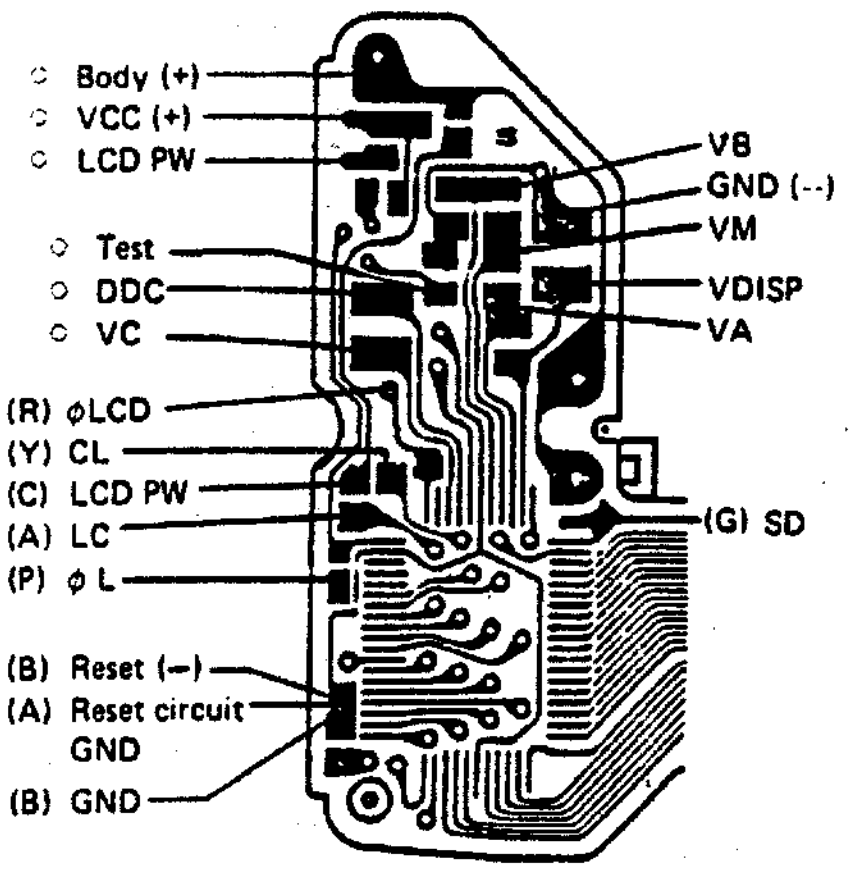


RV101: Manual adj. (1/8 sec)
RV103: Main comparator offset adj.
RV104: Iref adj.
RV106: BV spot adj.

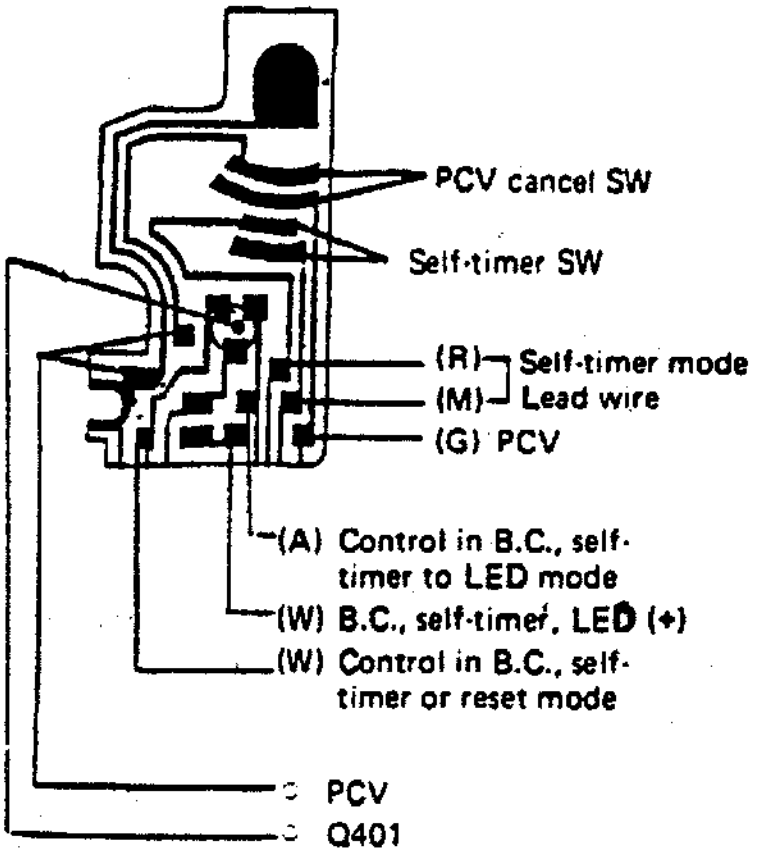
2. RS Circuit Board


(W) MEMO LED
(W) B.C. SELF LED
(W) LAMP
(R) Power supply (+)
C901
• To create reset time.
• 30 ms
C903
• To delay M SW ON on bipolar power supply.
• 2 ~ 3 ms
(C) Flash, MEMO LED
(D) Reset SW
(G) CPU reset
(A) Power supply (−)
(M) RDB
(B) M. SW
(Y) To make Q904 conductive
(H) Bipolar power supply (To inform M SW ON)
(P) CPU (To inform M SW ON)

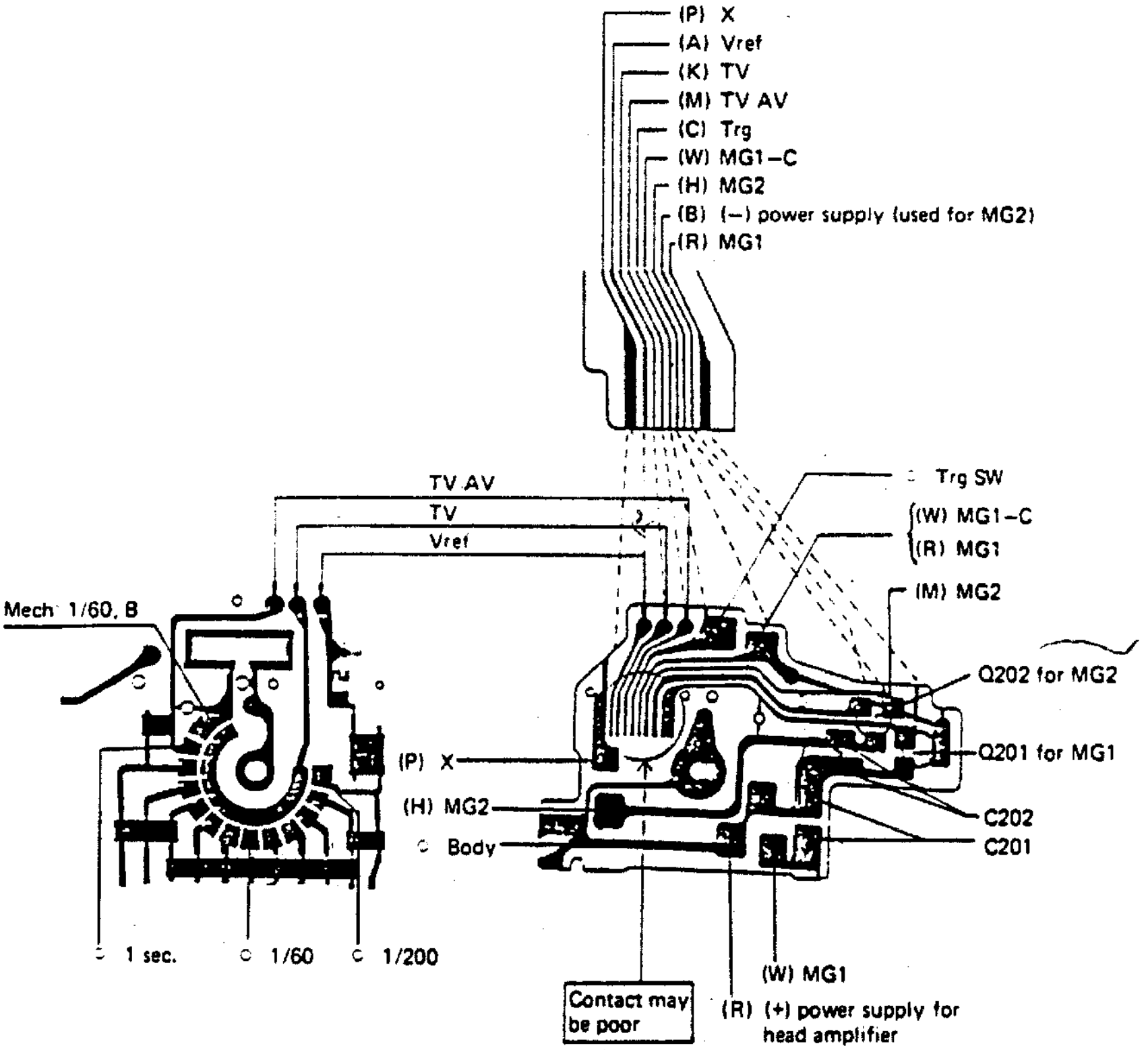
3. L Circuit Board



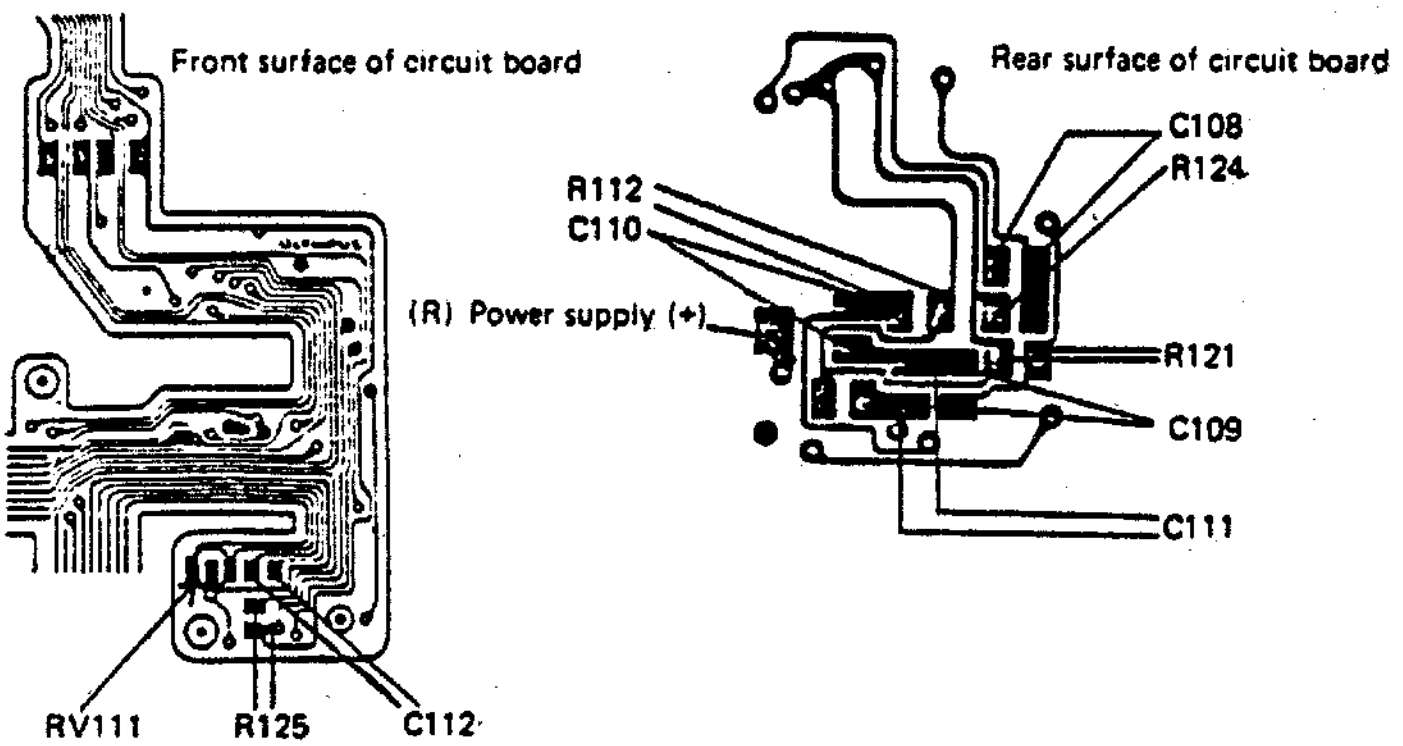
4. CE Circuit Board



5. TV Circuit Board

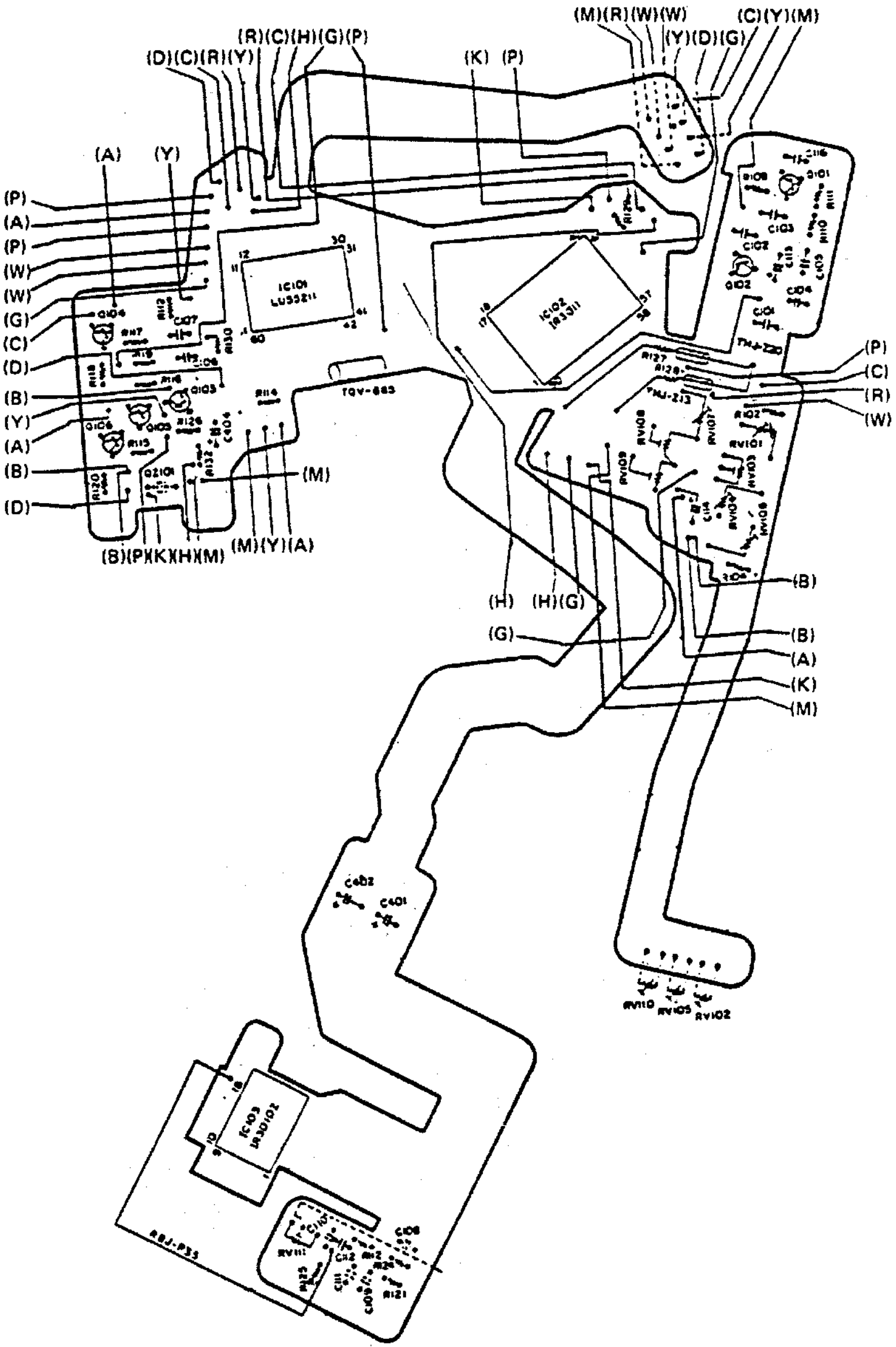


6. (M Circuit Board) Head Amplifier Unit

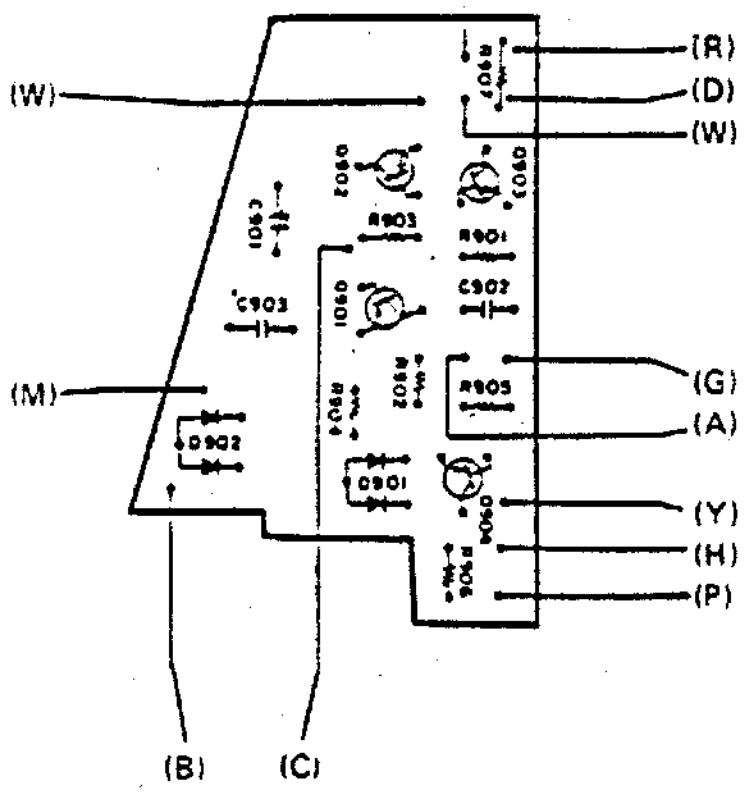


7. Layout of Electric Parts

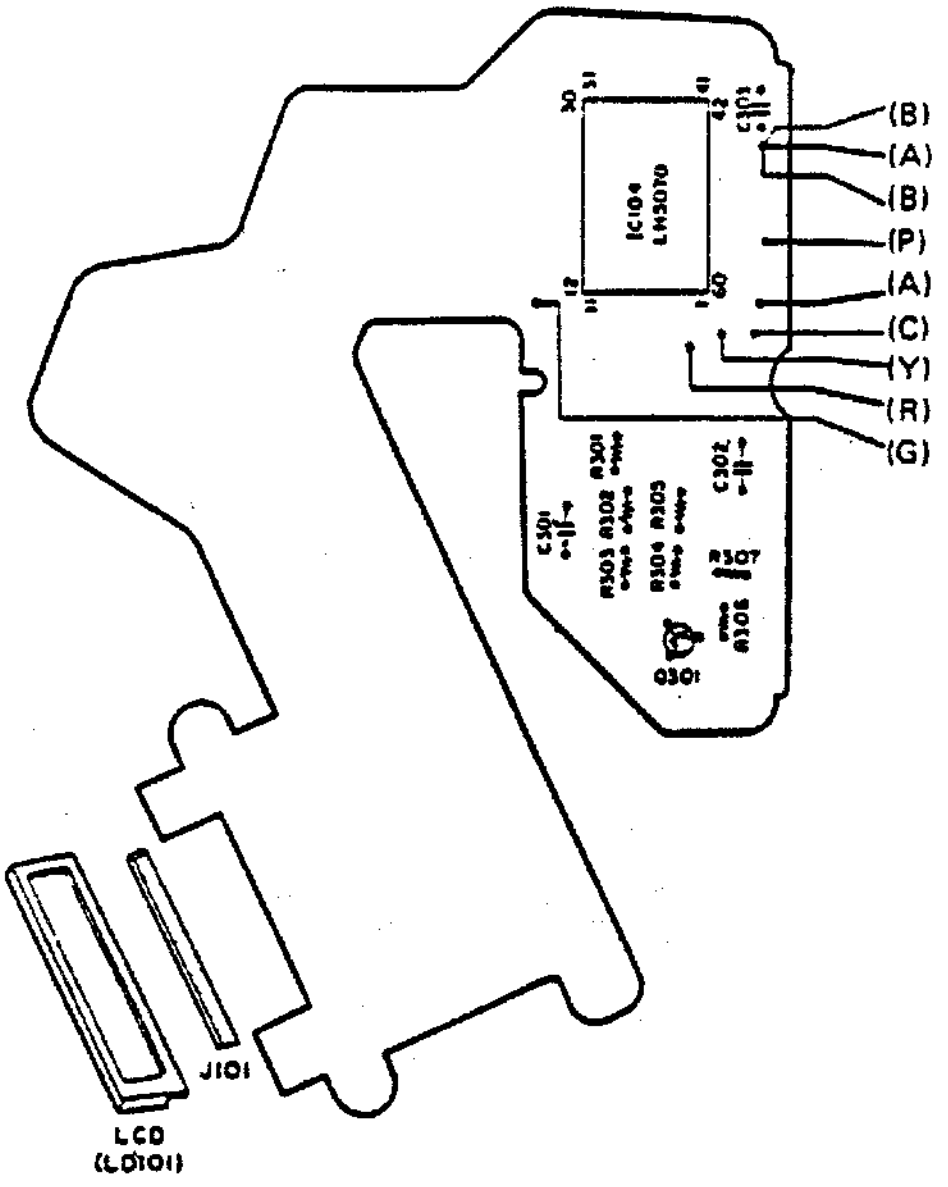
(1) M circuit board



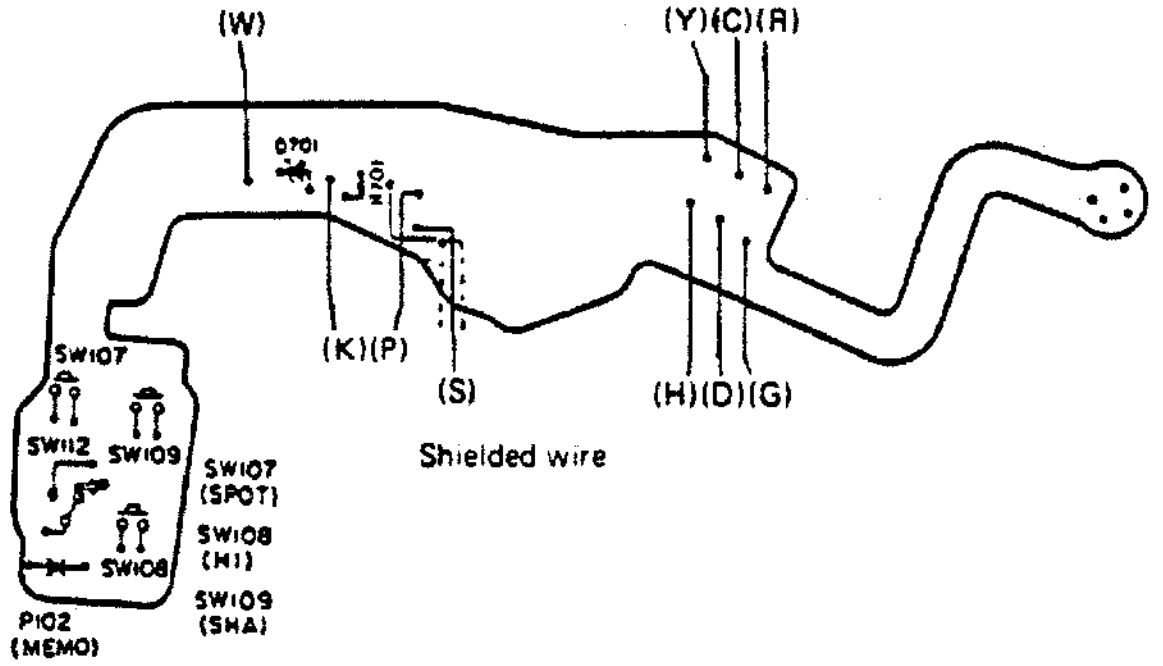
(2) RS circuit board



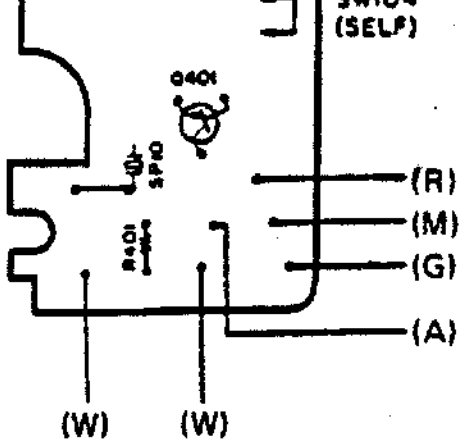
(3)' L circuit board



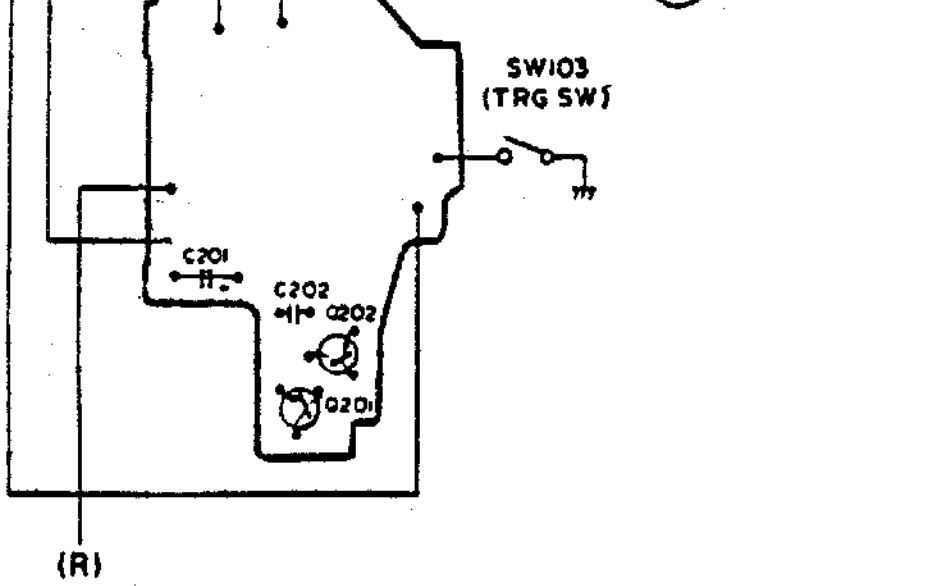
(4) U circuit board



(5) SE circuit board



(6) TV circuit board

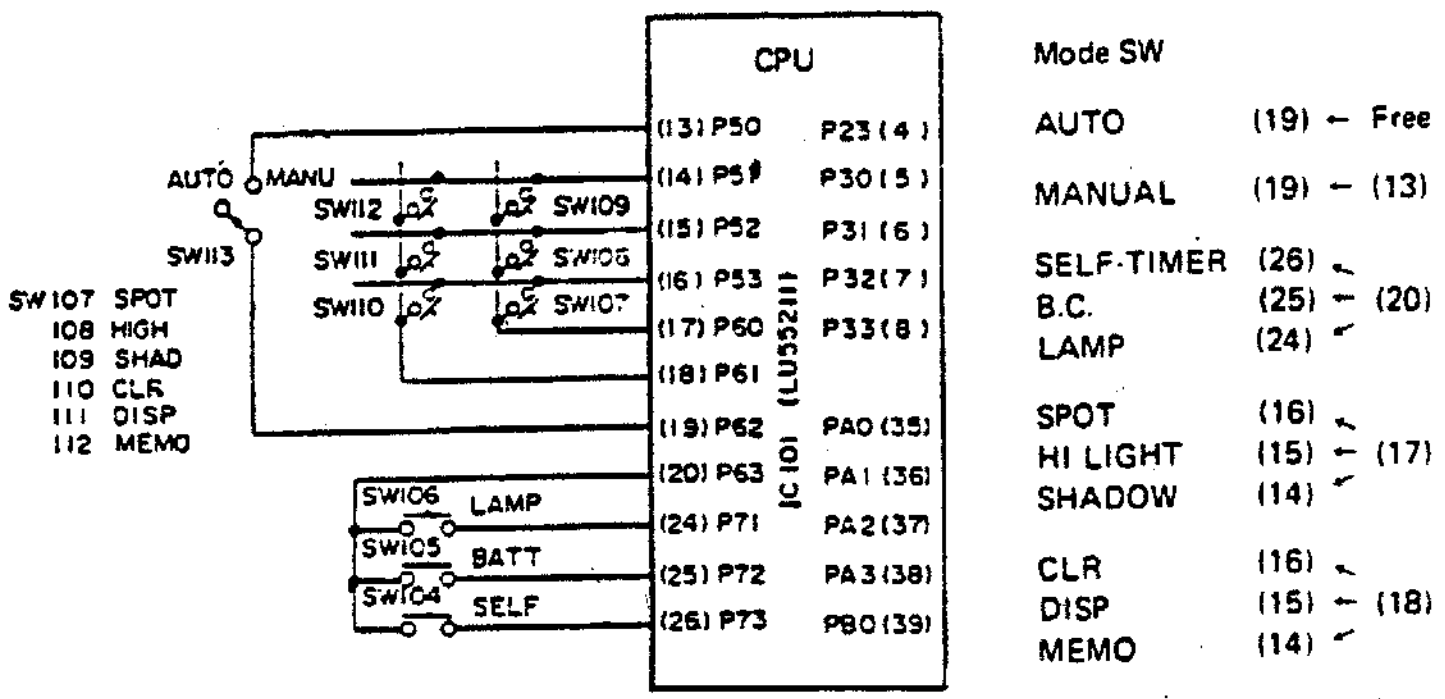


III. INPUT AND OUTPUT VOLTAGES OF ELECTRIC CIRCUITS

1. Power Supply Circuit

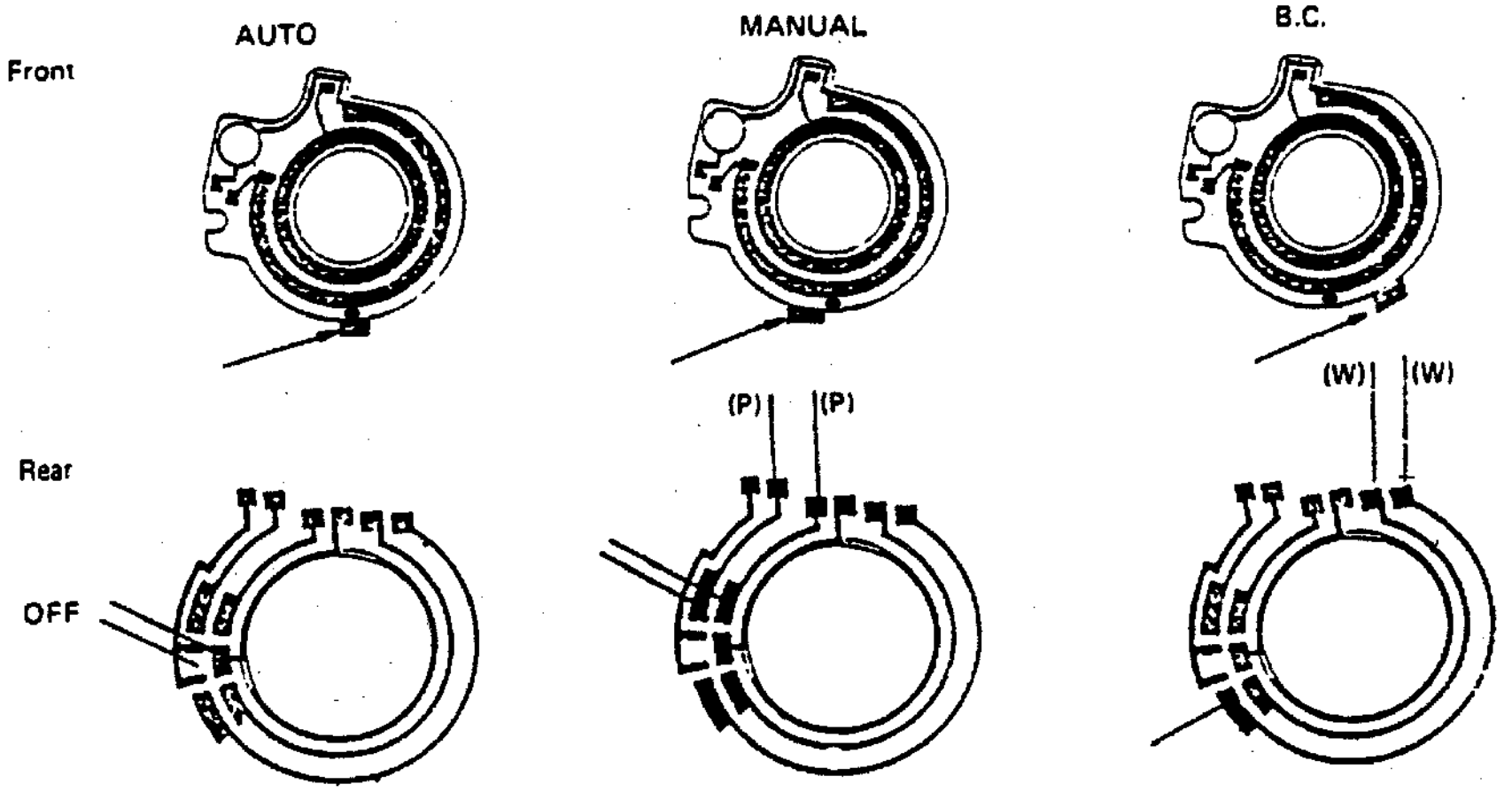
1-1. Mode switch circuit

(1) Circuit diagram

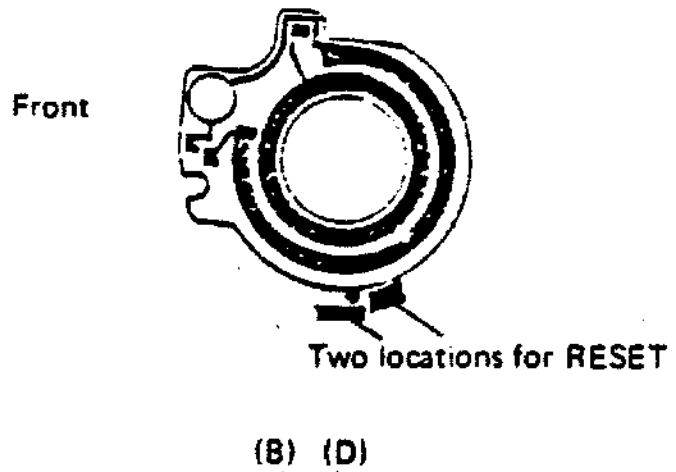


(2) Mode selection

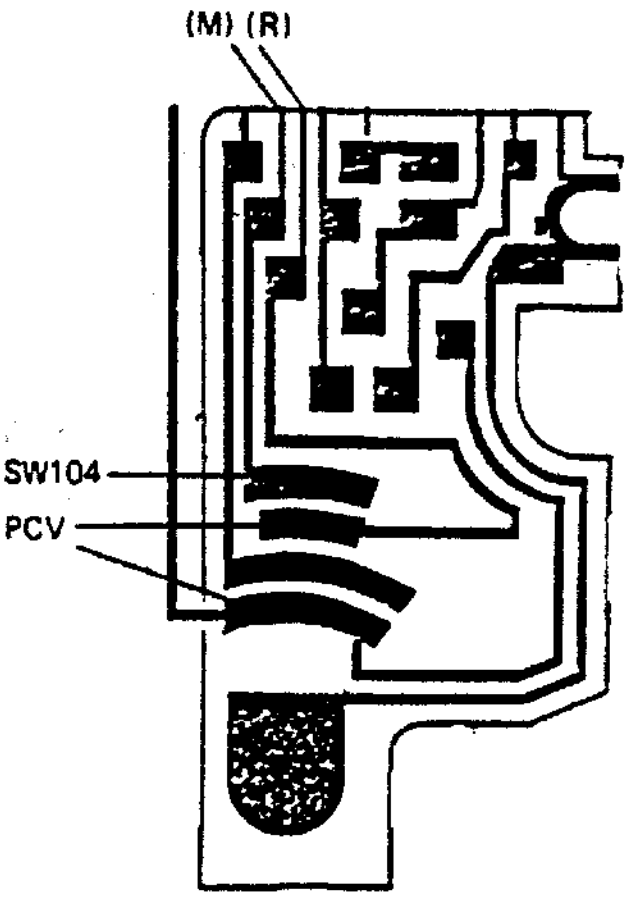
- After detaching the top cover, set ZJ178200 (M selector switch) at the position shown below:



RESET (for reference)

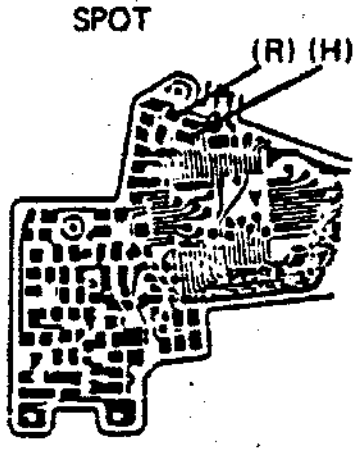


SELF

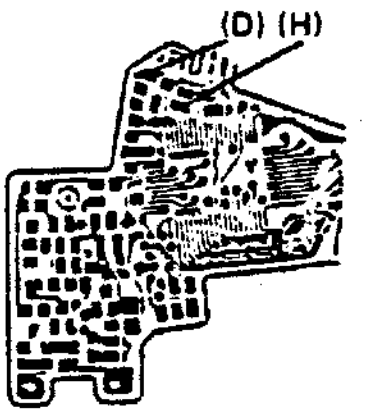


- After detaching the top cover, the camera can be set in each mode by shorting the point indicated below with tweezers.

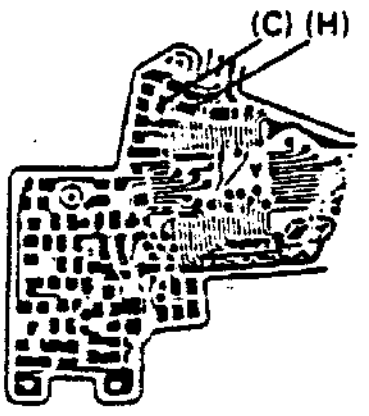
SPOT



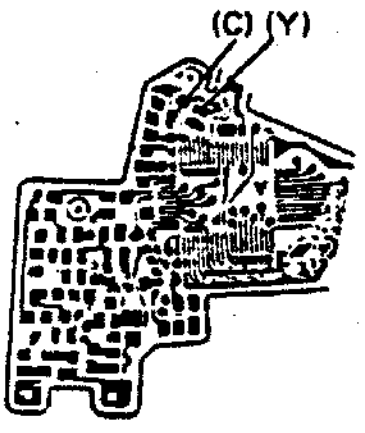
HI LIGHT



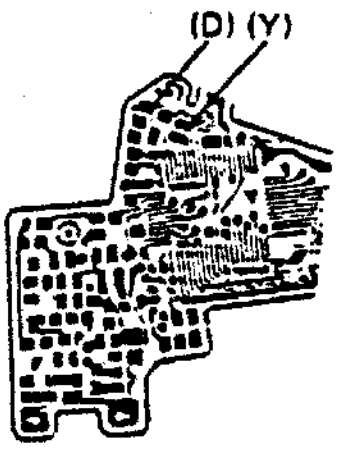
SHADOW



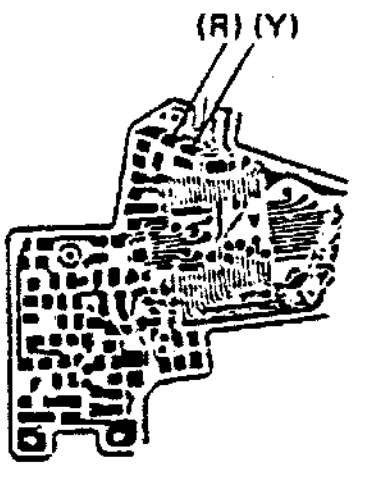
MEMO



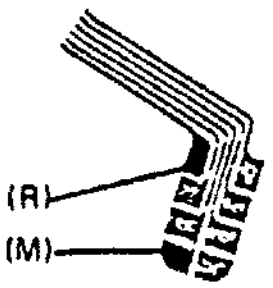
DISP



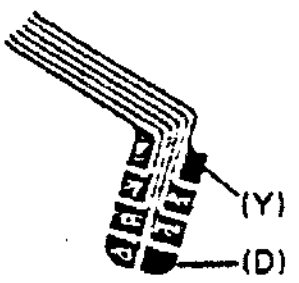
CLR



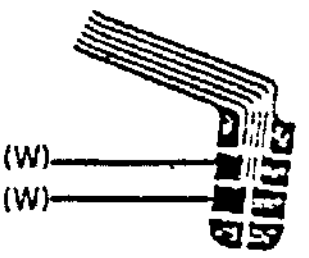
SLEF



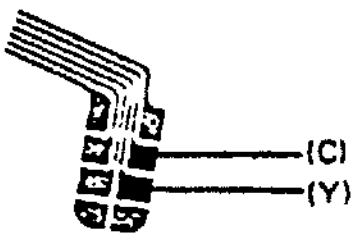
DISP



LMAP

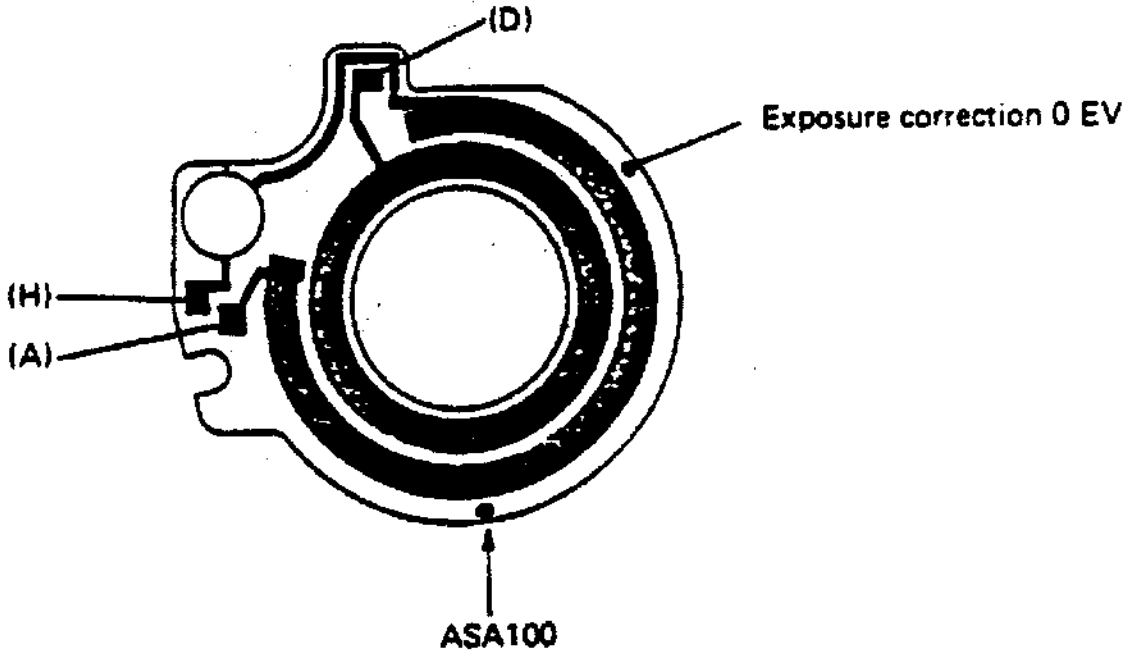


M. CLR



(3) Position for correcting ASA exposure

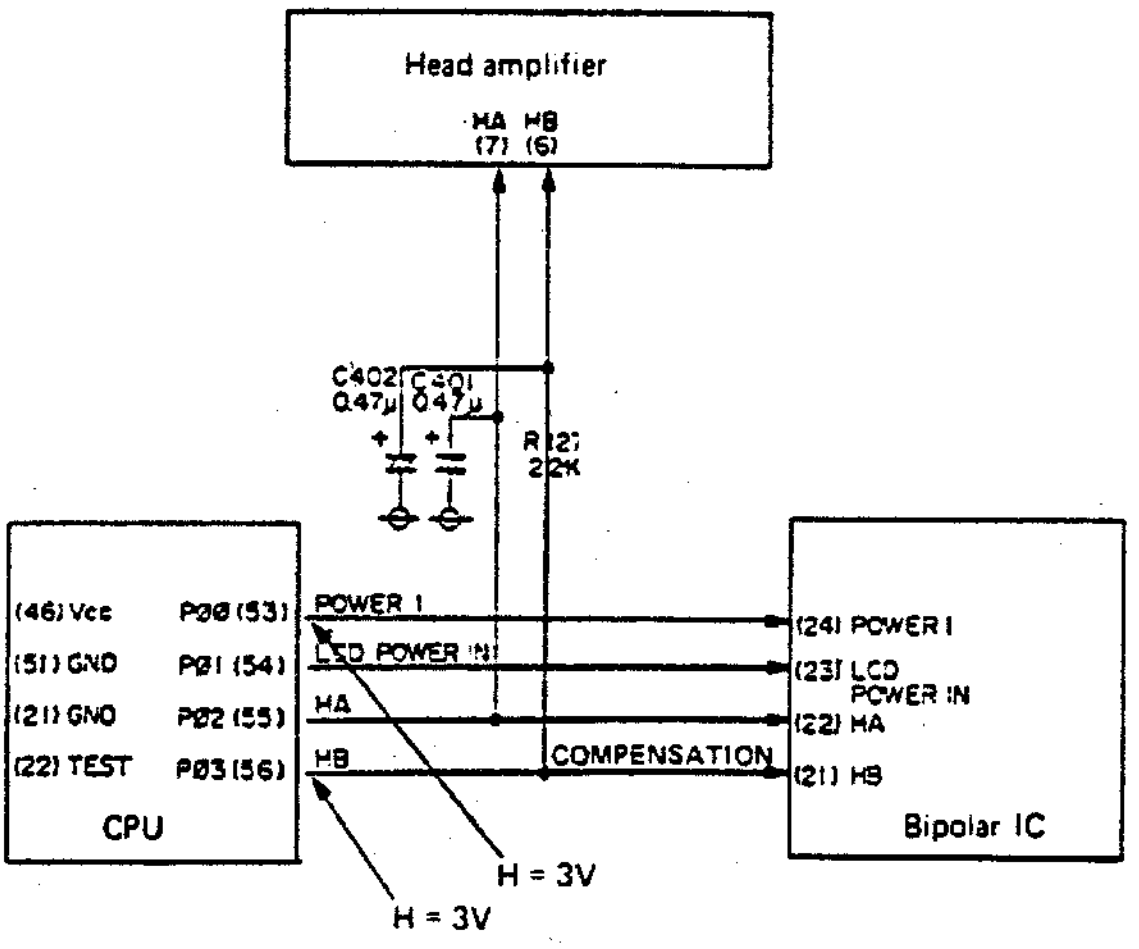
- The SV lever contact and CV lever contact are brought into contact at the points shown below:



1-2. Bipolar Power Supply

- The POWER HB signal is necessary to operate the bipolar power supply.
- Preparations
  1. Measuring instrument a. Digivol or circuit tester
  2. Mode a. B.C., AUTO or MANUAL
     - Attach the lens to the camera.
     - Light the LED in the viewfinder.

(1) Circuit diagram



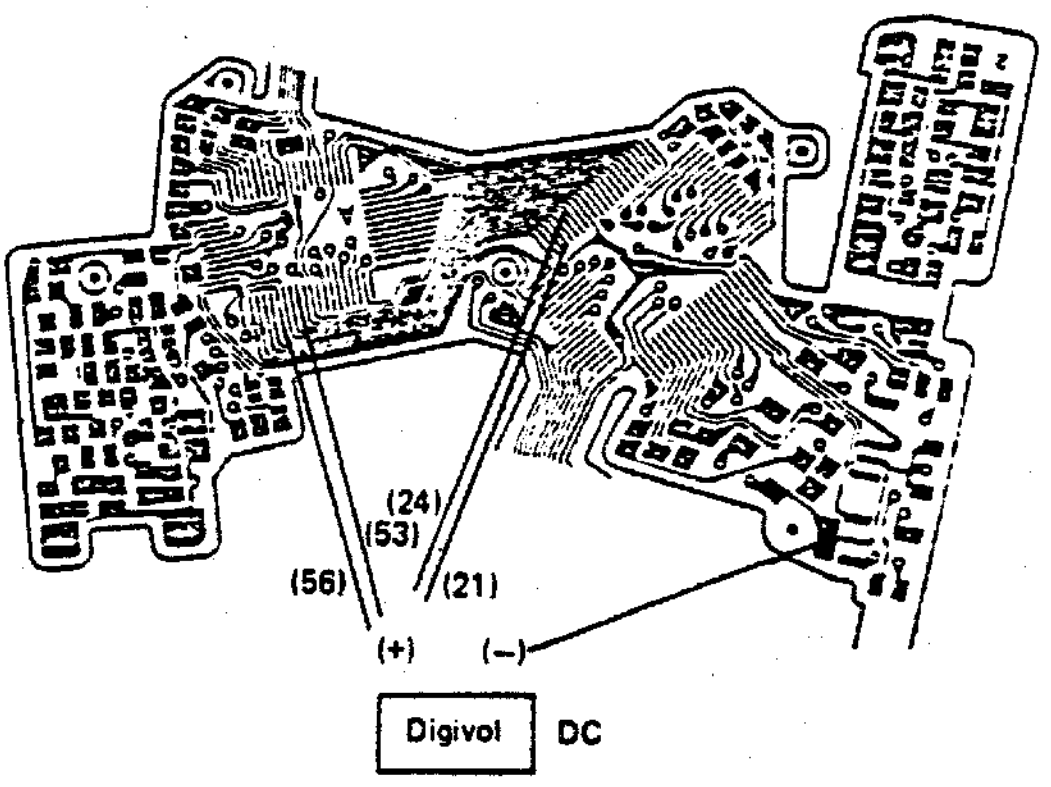
(2) Wiring diagram

1. Turn ON the mode selector switch.
   POWER 3V
2. HB signal output (CPU pin No. 56)

During indication in viewfinder		3V
During exposure	AUTO	0V
	MANUAL	3V
	SPOT	3V

CPU	
Pin No. 53	3V
Pin No. 56	3V

Bipolar	
Pin No. 21	3V
Pin No. 24	3V



(3) Simple procedures to check POWER and HB signals

Check of POWER signal

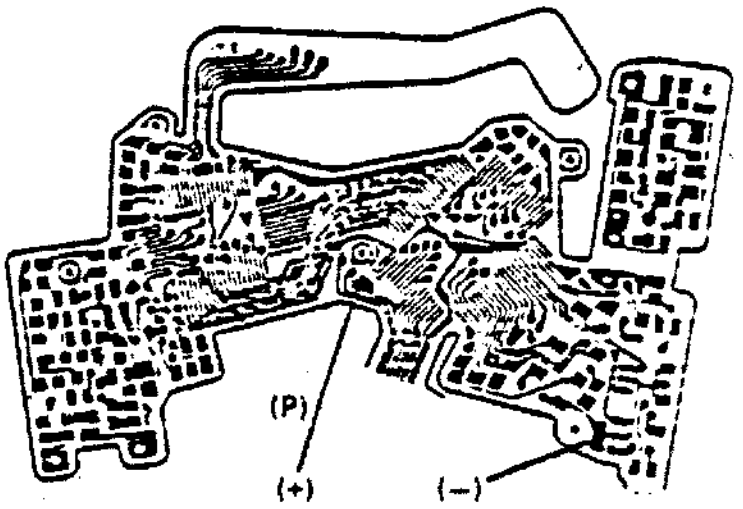
The POWER signal is provided when:

a. The shutter operates.
b. The LCD lights in the viewfinder.
c. The battery check system operates.
d. The self-timer LED lights.
e. The PCV sounds.

2. Check of HB signal
   - Measure a voltage of 1.8/1 V.

During indication	1.8V
During exposure	1.0V

Simple HB signal check

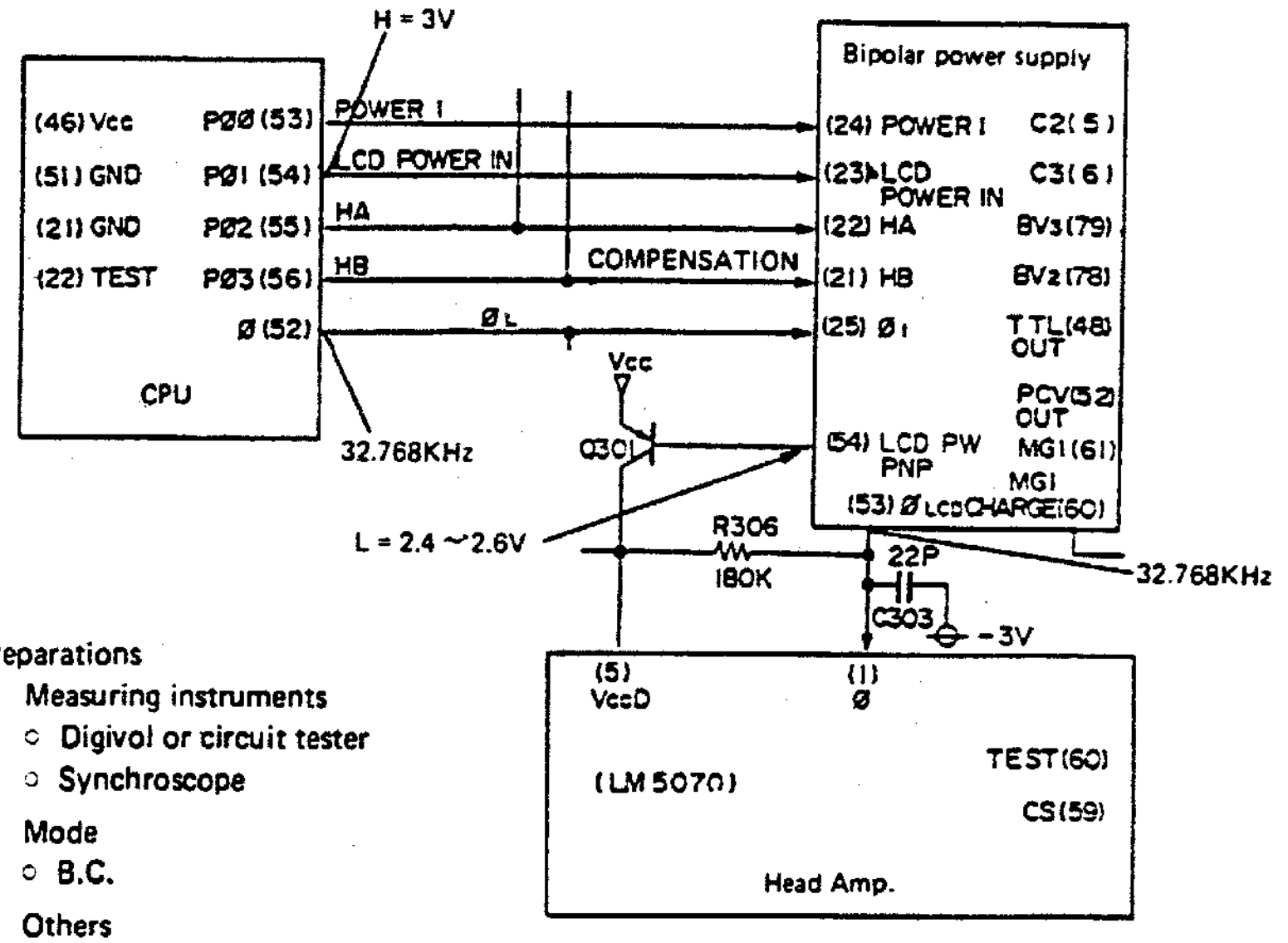


Digivol DC

1-3. LCD·D Power Supply

- The LCD D power supply requires four types of signals: Power, HB, LCD power and ø. No indication is provided in the viewfinder unless these signals are not provided.

(1) Circuit diagram



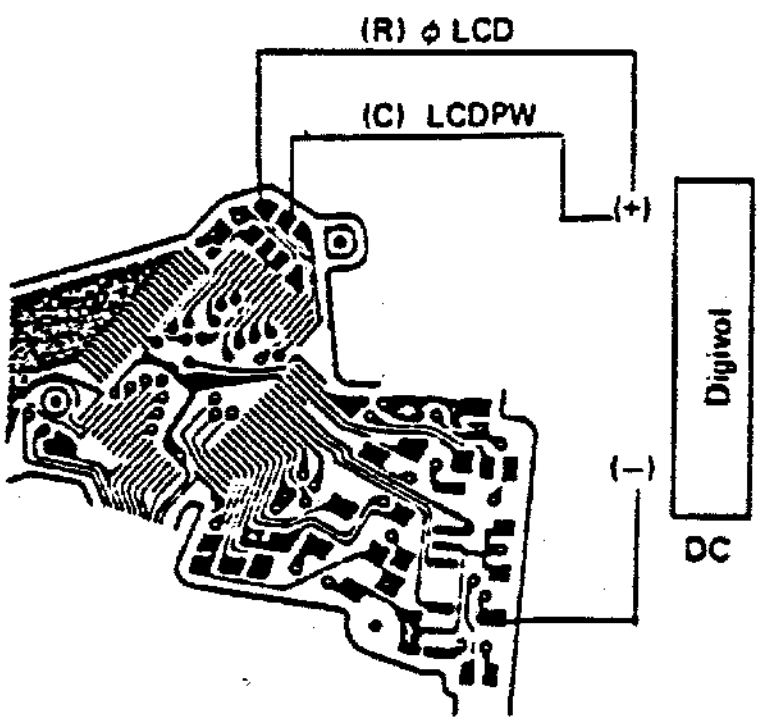
- Preparations
  1. Measuring instruments
     - ○ Digivol or circuit tester
     - ○ Synchroscope
  2. Mode
     - ○ B.C.
  3. Others
     - ○ Attach the lens to the camera.
     - ○ Light the LED in the viewfinder.

(2) Wiring diagram

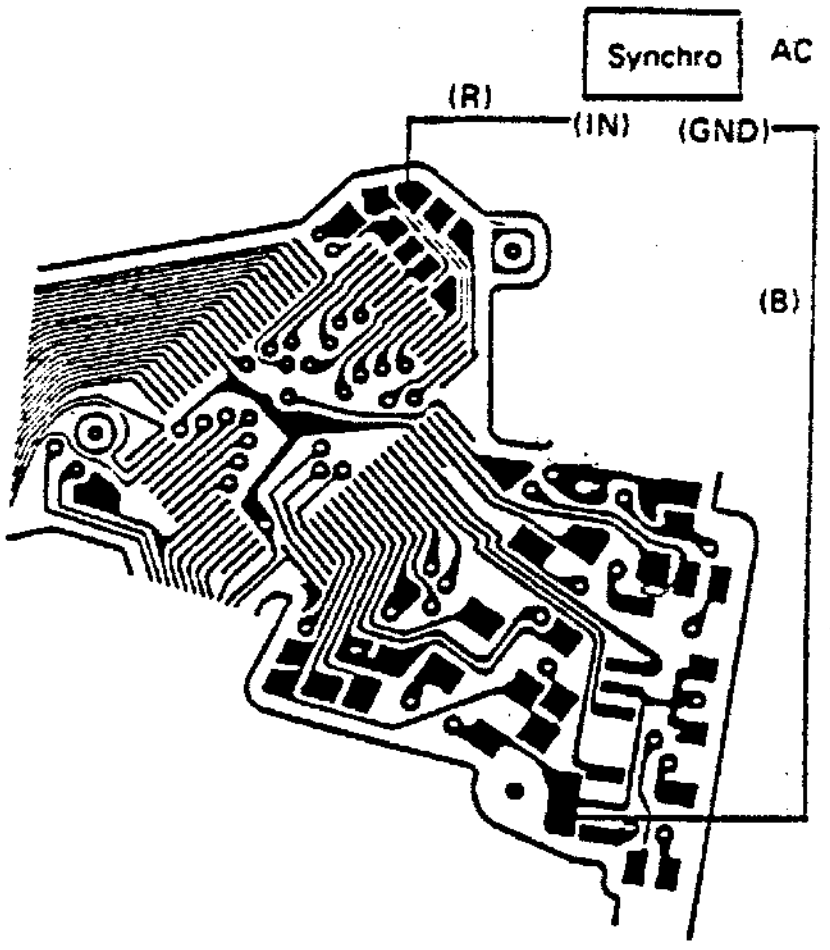
- Voltages during indication

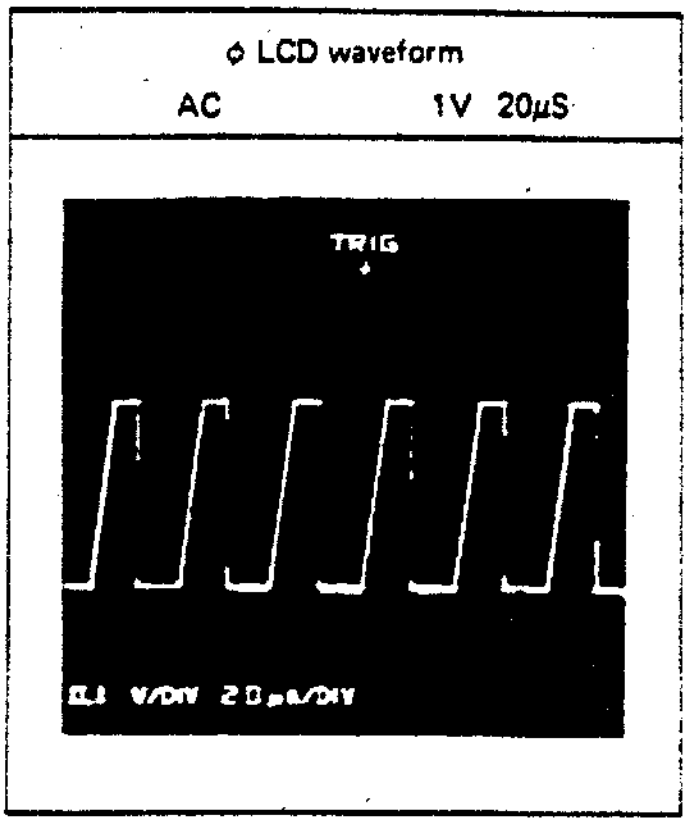
	Leg No.	Voltage (V)
LCDPW	54	2.4 ~ 2.6
ϕ LCD	53	1.0 ~ 2.0

- When no output voltage is provided:
  1. LCD PW
     Check LCDPW from the CPU.
  2. ϕ LCD
     Check ϕ from the CPU.



(3) Waveform of ϕ LCD

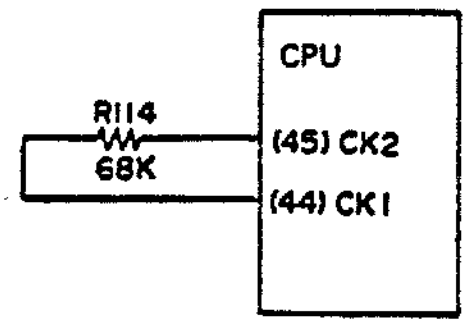




2. Oscillator Circuit

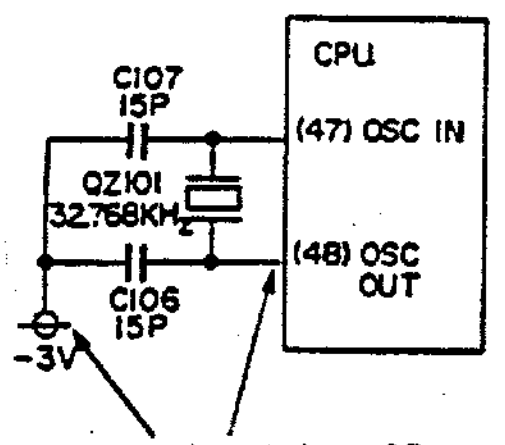
(1) Circuit diagram

A: CPU system clock pulse



- The CPU cannot operate when the signal is not oscillated.

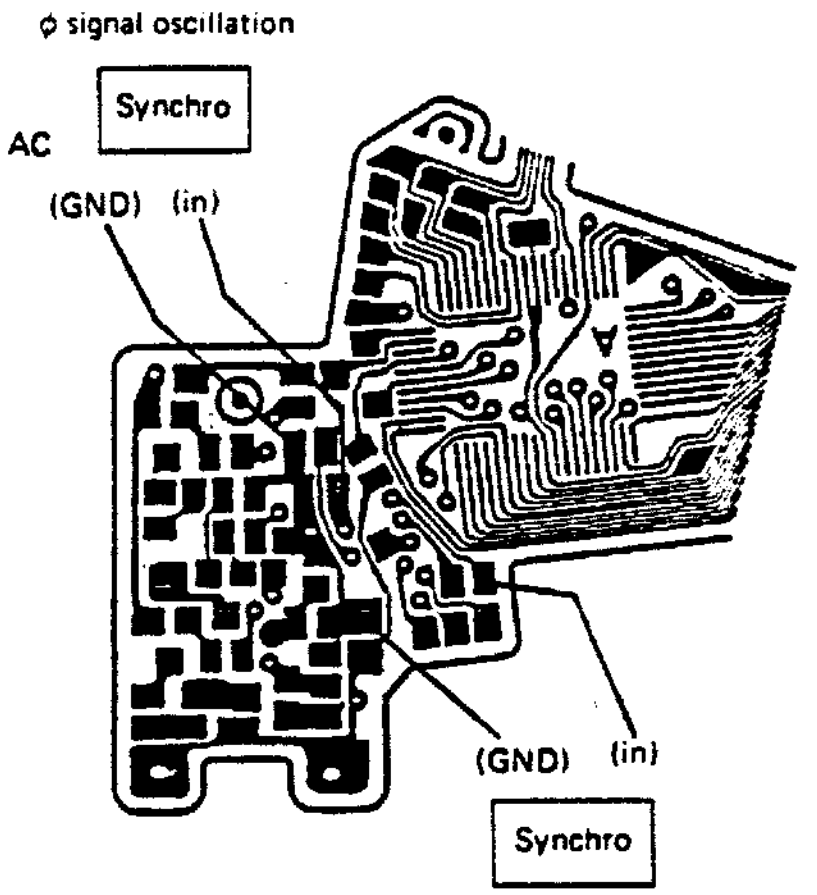
B: ϕ signal oscillation



- The PCV cannot sound and the LCD cannot light when the signal is not oscillated.

(2) Wiring diagram

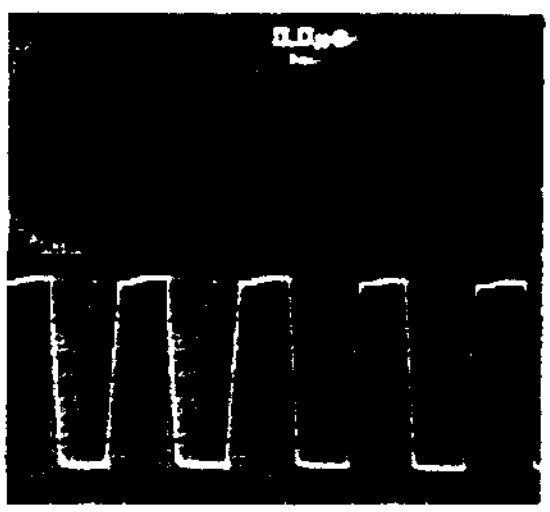
- Mode: B.C.
- Attach the lens in position.
- Light the LCD in the viewfinder.



CPU system clock pulse

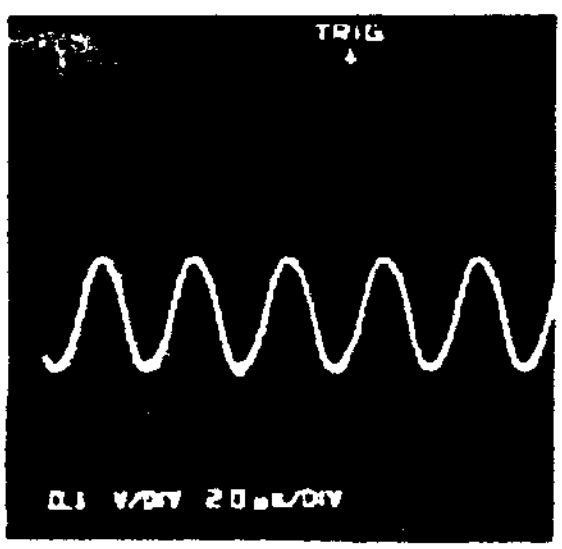
Waveform of CPU system clock pulse

AC 1V 1μS



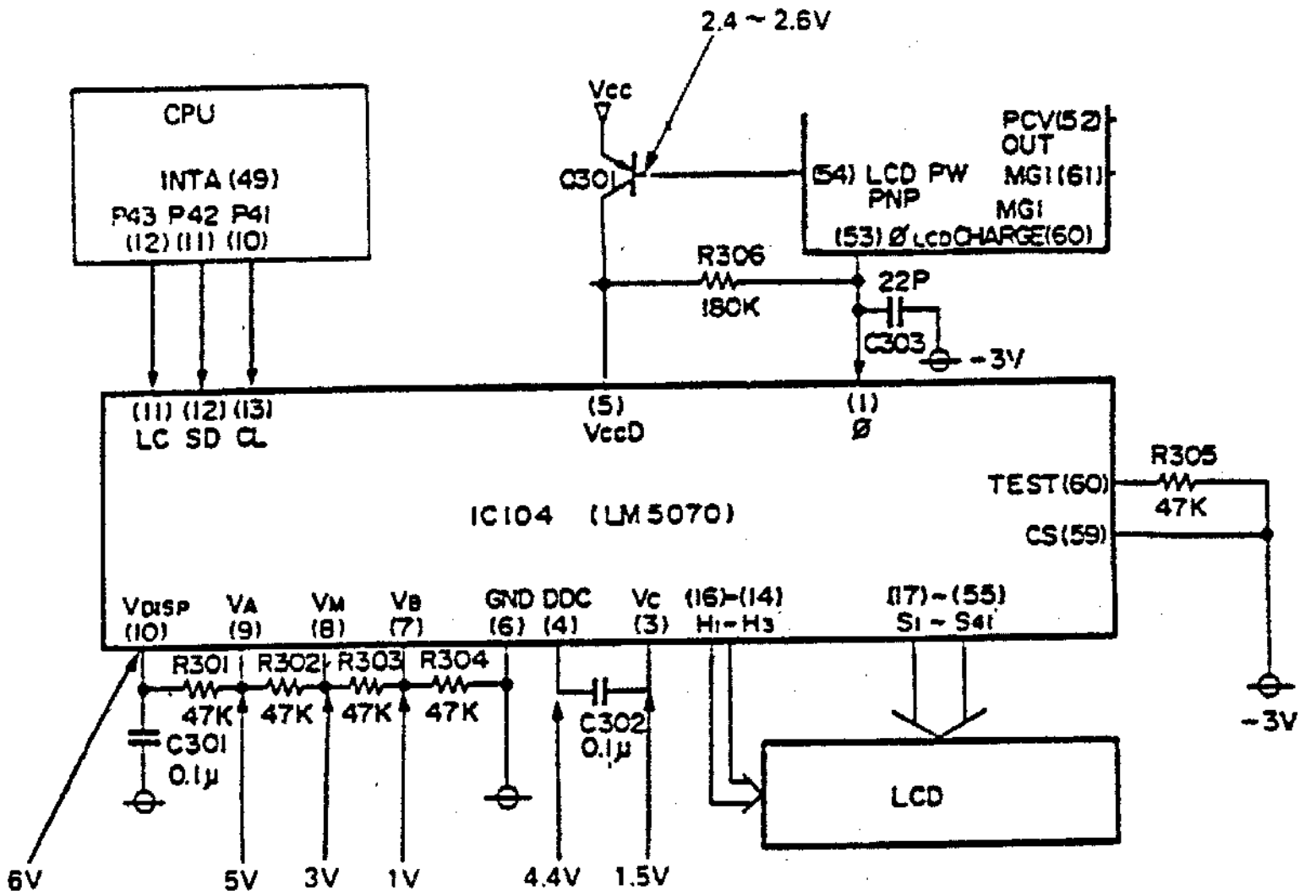
Waveform of ϕ signal

AC 1V 20μS



3. LCD D Circuit

(1) Circuit diagram



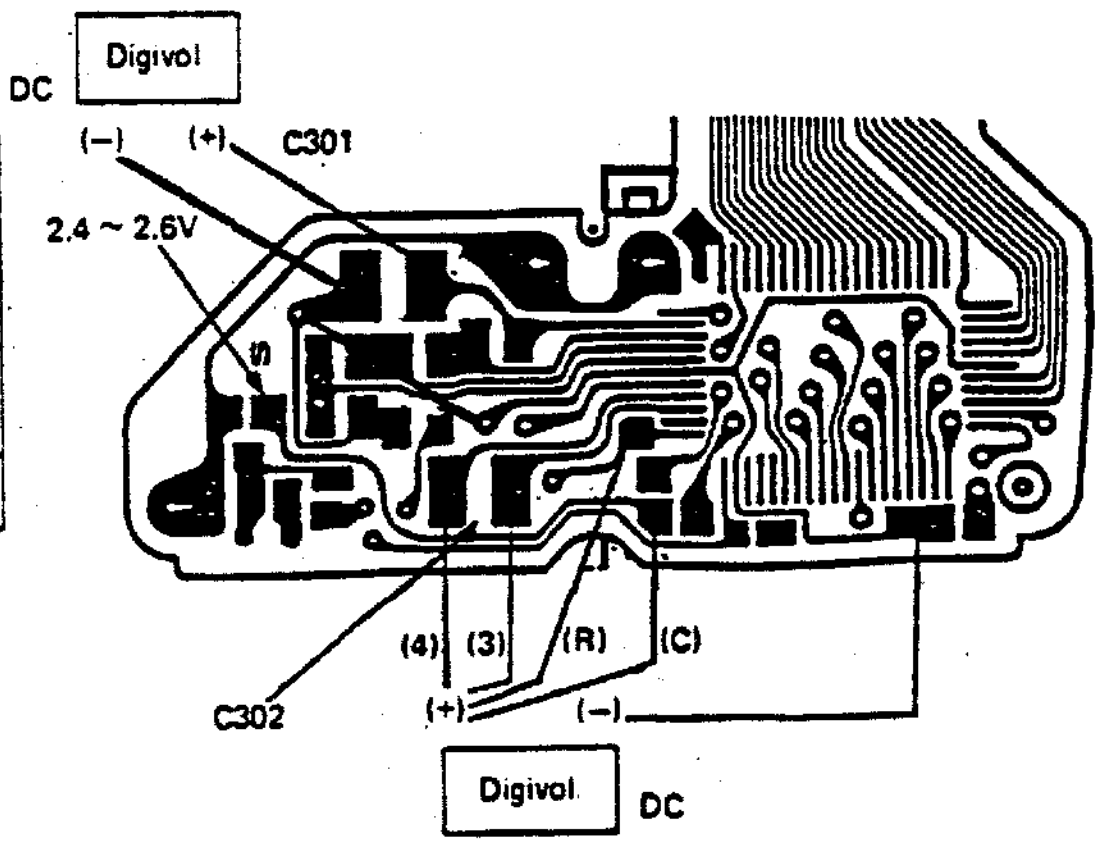
- Preparations

1. Measuring instruments
   - ○ Digivol or circuit tester
   - ○ Synchroscope
2. Mode: B.C., AUTO or MANUAL
   - ○ Attach the lens in position.
   - ○ Light the LCD in the viewfinder.

(2) Wiring diagram

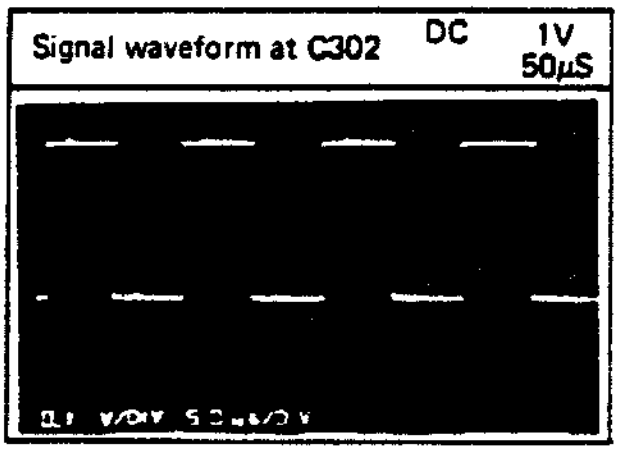
- Voltages at check points

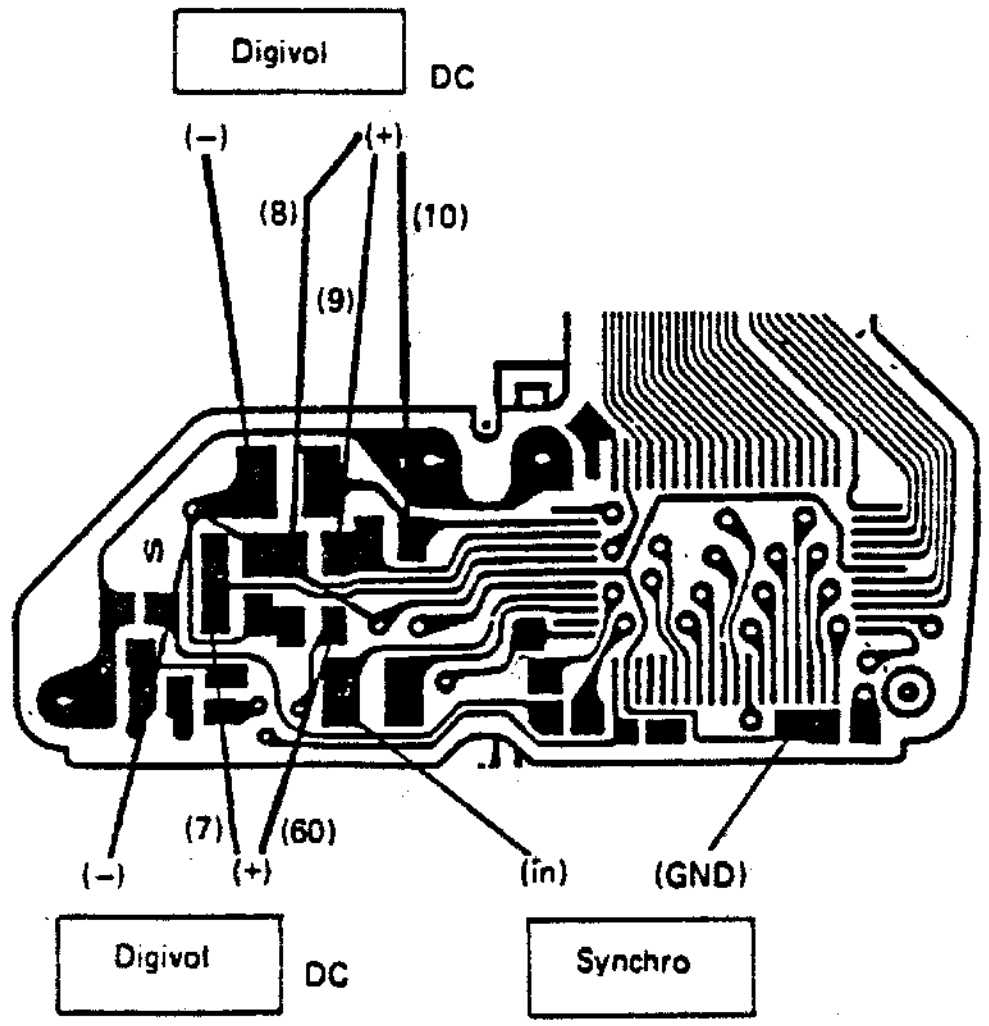
	Check point	Voltage
LCD PW	(C)	2.4 ~ 2.6V
ϕ LCD	(R)	1.0 ~ 2.0V
C302 C302	Pin No. 3 Pin No. 4	1.5V 4.4V
C301	Pin No. 10	6.0V



- Voltages at check points

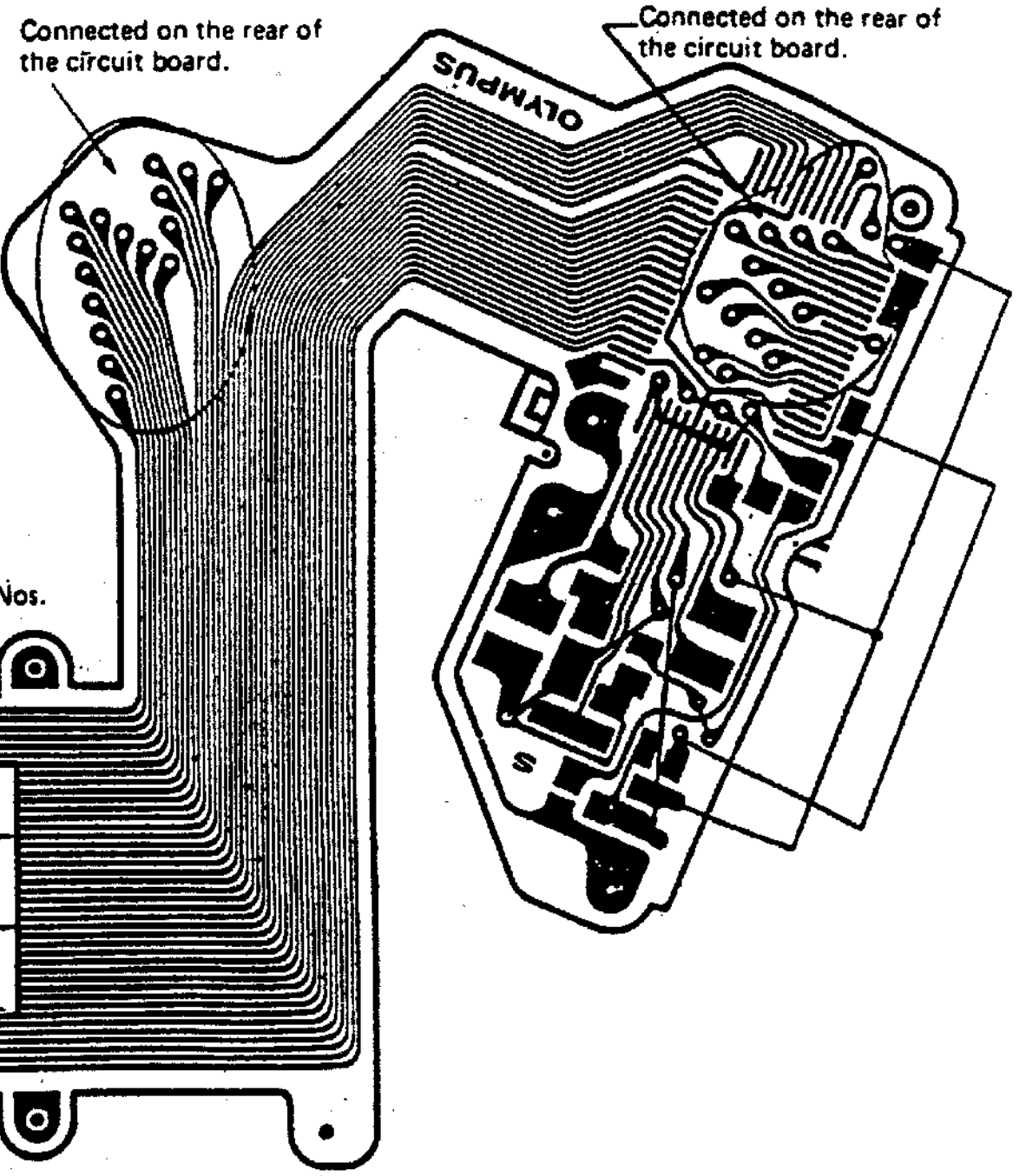
	Leg No.	Voltage
R301	10	6V
R302	9	5V
R303	8	3V
R304	6	1V
R305	60	0V





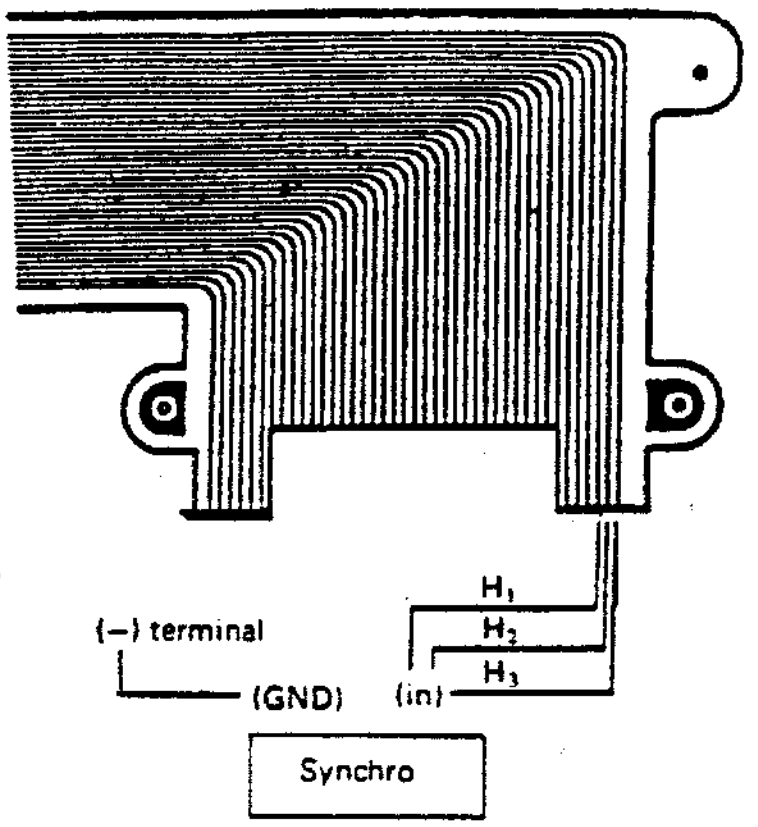
(3) Connection of LCD patterns

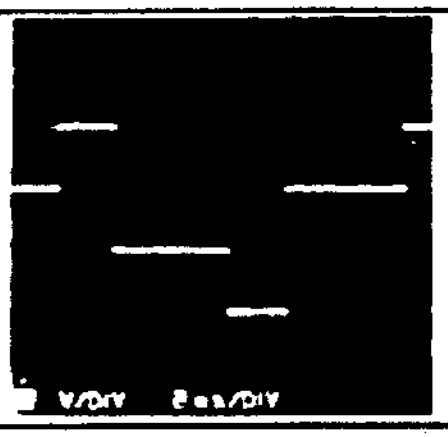
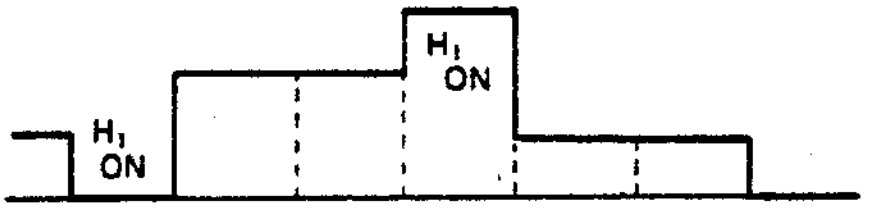
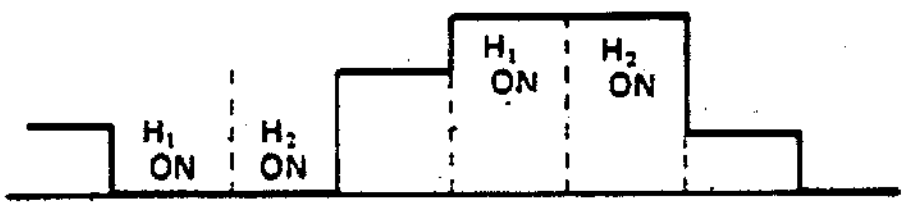
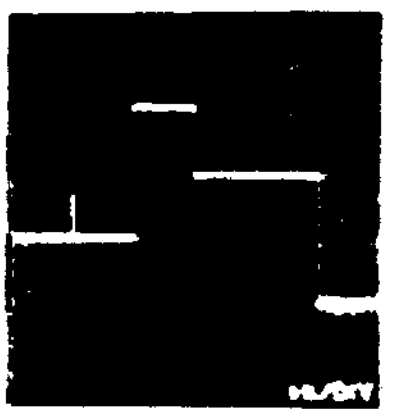
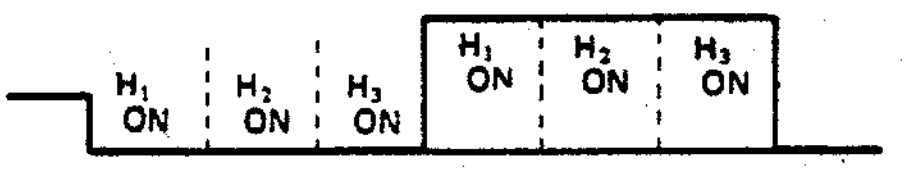
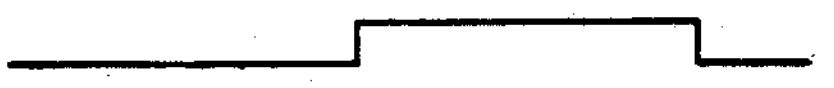
- LCD D output voltage
- When the indication is abnormal, check the LCD input voltage.
  Voltage should be at least 3.0 V at each terminal.



(4) Waveform of LCD D output

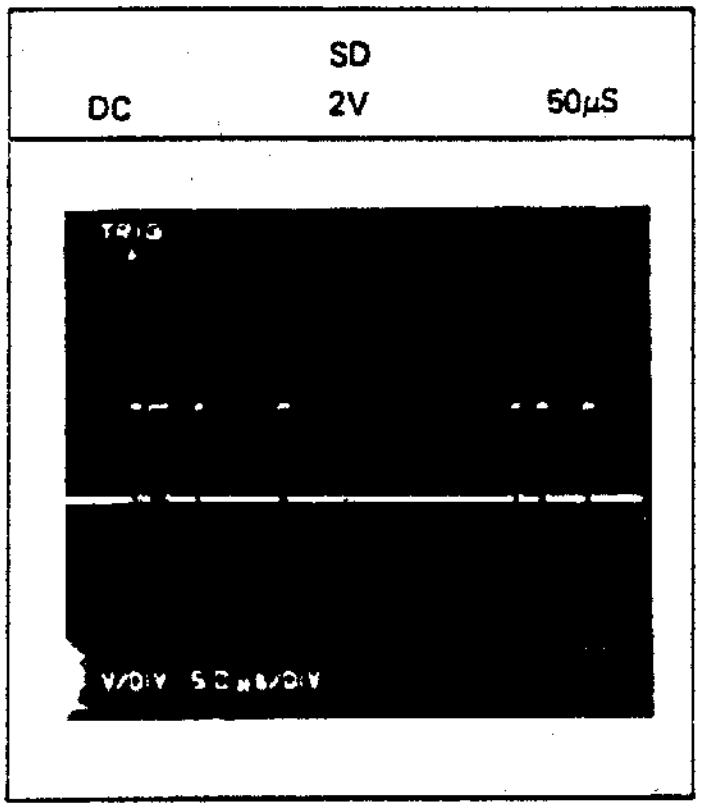
- The signals for the characters and symbols desired for indications can be checked by measuring compositive voltage of the back plate signal and segment signal.
- The characters and symbols can be normally indicated when the composite signal is 4 V or higher

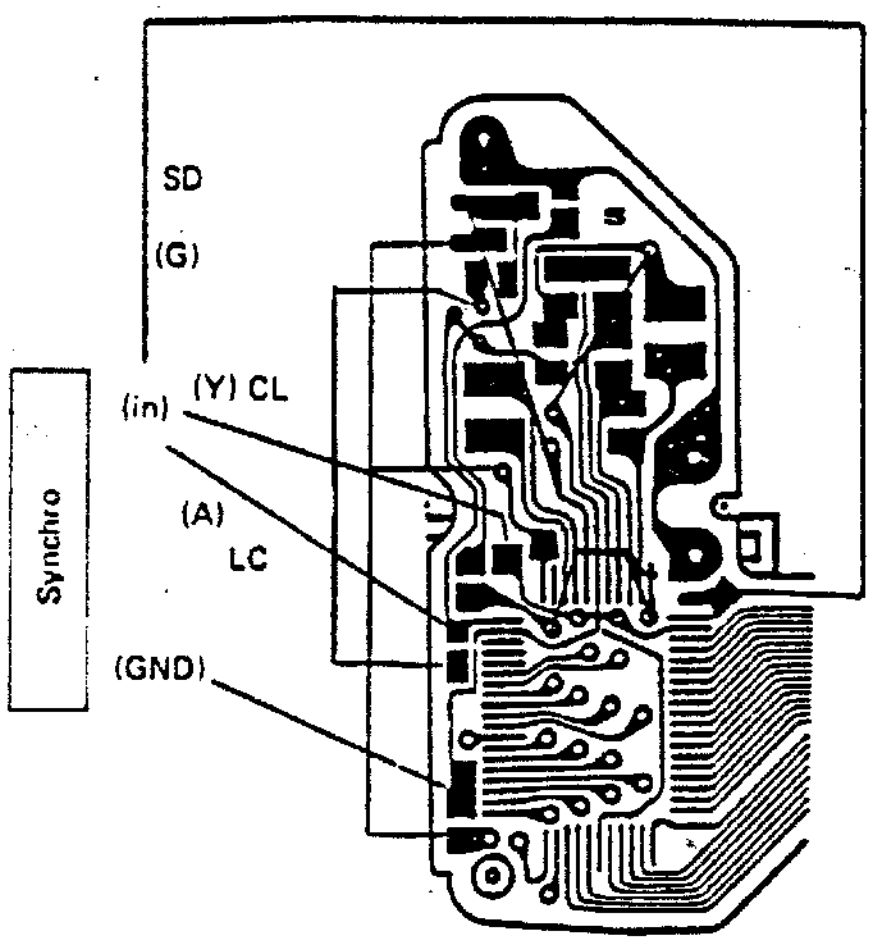


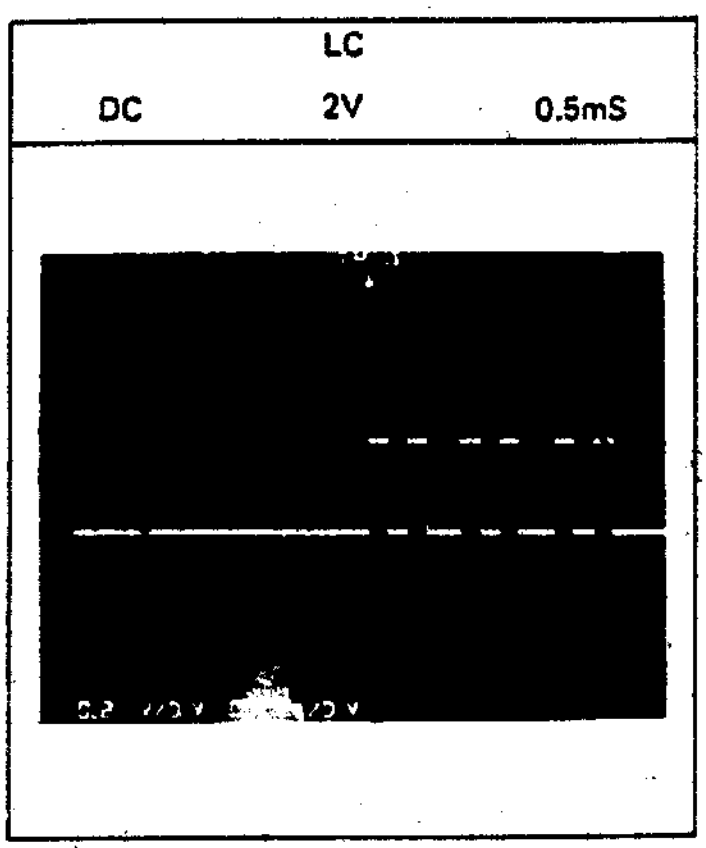
Waveform of H_1 signal	[Segment signal]
	For indicating H_1 ● Numeral and symbol only are indicated. ● Bar or dot is not indicated. 
Waveform of H_2 signal	For indicating H_1 and H_2
	● Bar is also indicated. 
Waveform of H_3 signal	For indicating H_1, H_2 and H_3
	● All types of signals are indicated. 
	For indicating no signal
	

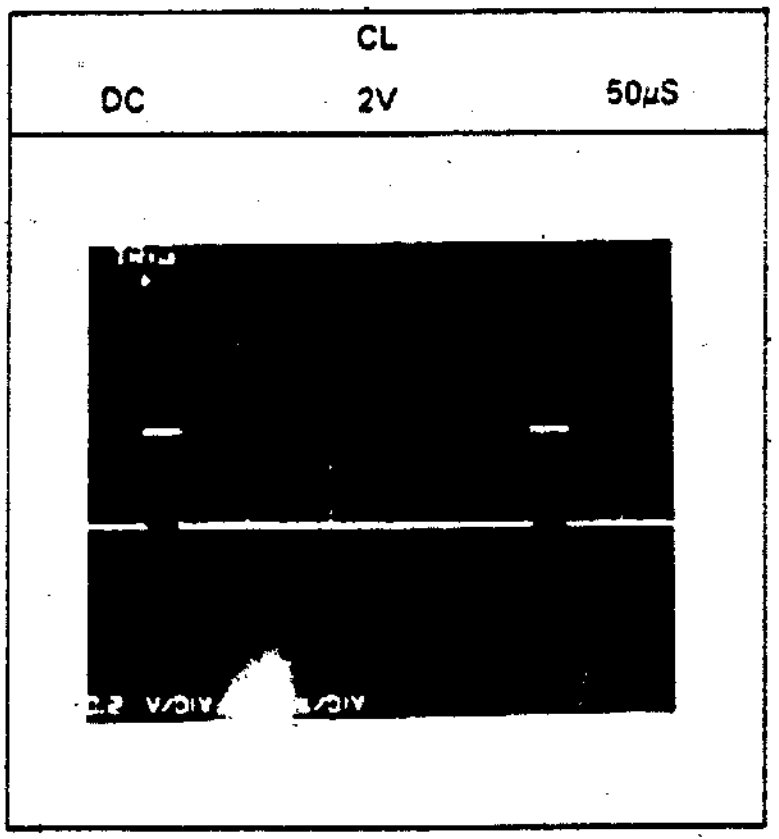
(5) Signal output from CPU

- Check waveform of signal from the CPU on a synchroscope.



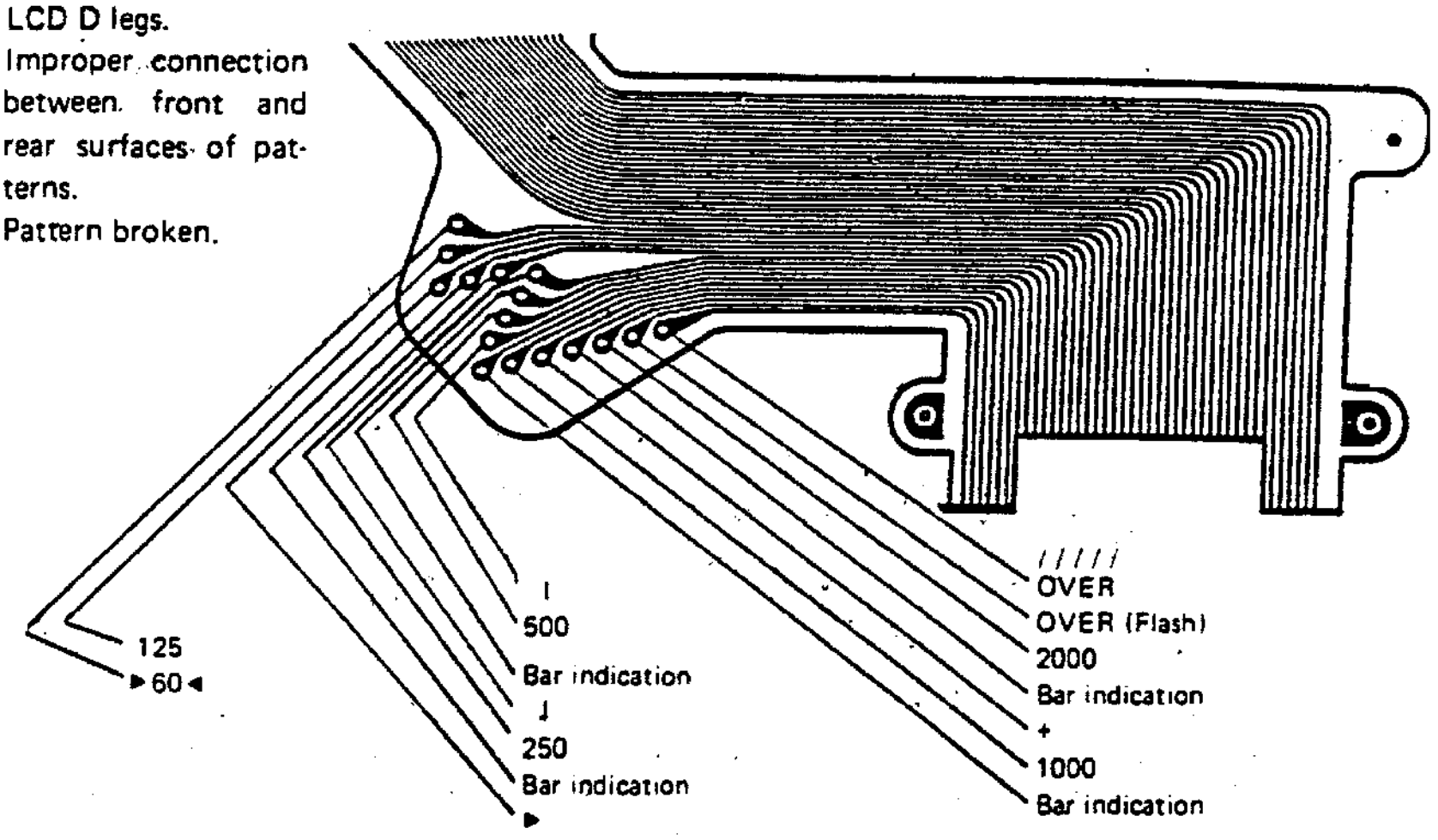






(6) Check of indicated symbols and characters for lack

- Cause
  1. Defective soldering of LCD D legs.
  2. Improper connection between front and rear surfaces of patterns.
  3. Pattern broken.



4. When the symbols and characters shown in the drawing are erased, check the patterns for connections on the front and rear surfaces.

(5) Indications of LCD D IC leg Nos.

[Segment]

Leg No.	17	18	20
Indication	MEMO + − ϟ	SPOT HI LIGHT SHADOW	UNDER

Leg No.	19	22	25	28	31	34	38	41	44	47	50	53	54
Indication	1	2	4	8	15	30	60	125	250	500	1000	2000	OVER

Leg No.	26	29	32	37	39	42	45	48	51	55	40
Indication	−	I	I	◀	I	▶	I	I	+	///// OVER	▶60◀

[Back plate]

H1	16	1 ///// OVER	2	4	8 OVER MEMO	15	30	60 +−	125 II ▶	250 I ◀	500 II	1000 UNDER	200 SPOT
H2	15	SHADOW ϟ ■■■ ..... ■■■ (Bar indication)											
H3	14	+− HI LIGHT ◆◆◆ ..... ◆◆◆ (Dot indication)											

4. LCD (Liquid Crystal Display)

(1) Functions of LCD

- The LCD indicates data required for operating the camera.
- The LCD is controlled by the CPU and LCD D.

(2) Procedures to check LCD

- Simple procedures

  Apply the positive voltage to pin No. 60 of LCD-D IC.

  The LCD is normal when all the items are indicated.

  If all the items are not indicated, the LCD or LCD D is defective.

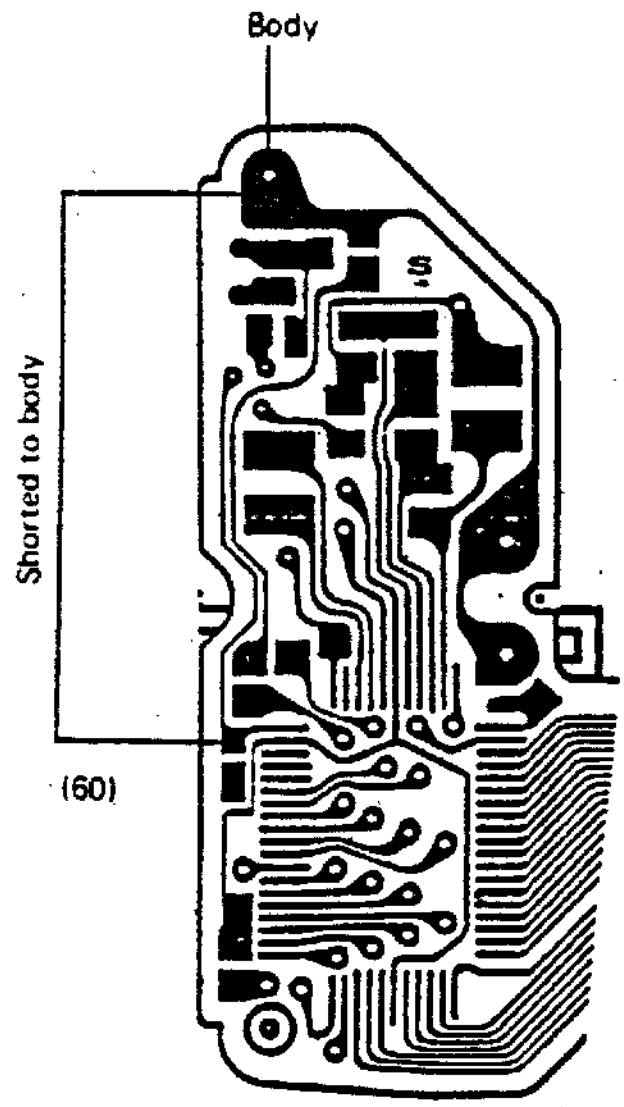
(3) Handling of LCD

1. Do not mark fingerprints on the LCD.
2. Do not wipe the LCD with a piece of dry cloth.
3. Do not use chemical for cleaning.
4. For clearning the LCD, wash it with water while brushing it with feathers of wild duck.

(4) When indications are unreliable

- Displace the LCD in the right-left direction.
- Unreliable (unstable) indication is a sign of defective indication circuit (LCD-D or LCD).

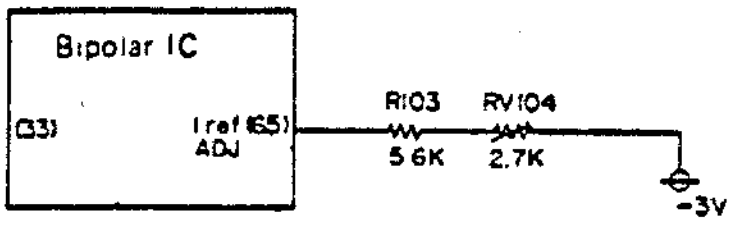
- Preparations
  1. Mode: AUTO or MANUAL
  2. Light the LCD indicator.



5. Reference Voltage and Current Circuits

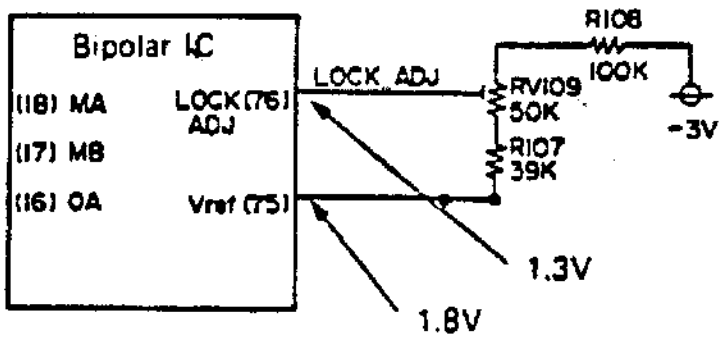
(1) Circuit Diagram

A. (DATA) Reference current circuit



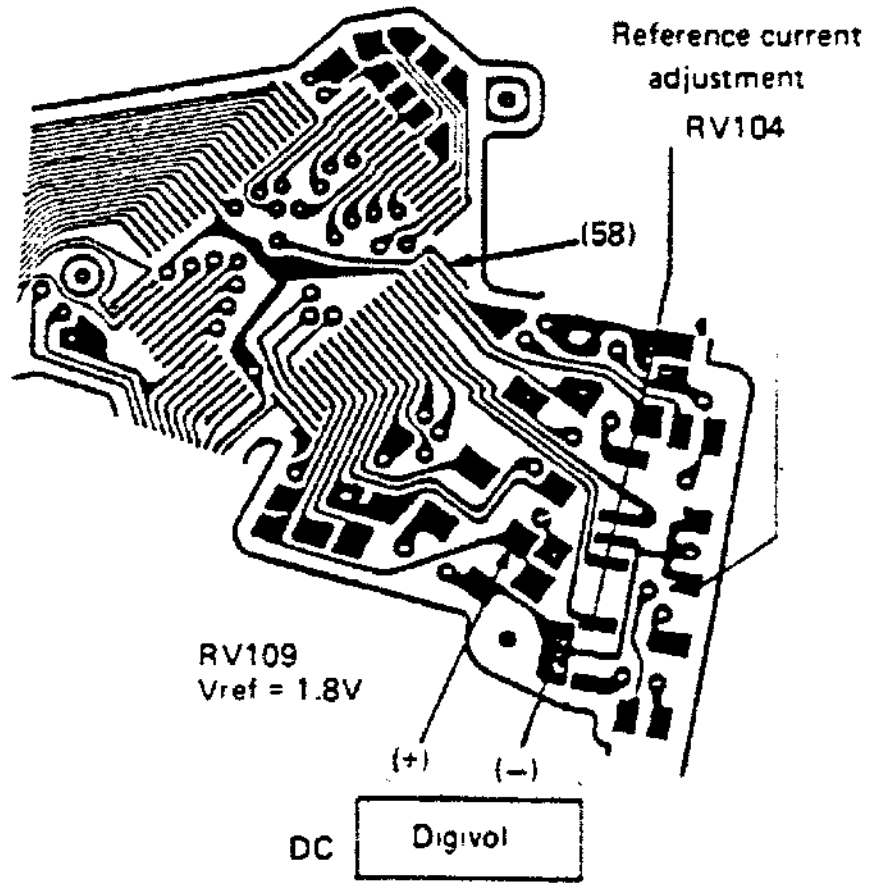
- This is a kind of temperature compensator circuit. When the reference current is deviated, all the circuits cannot operate accurately.
- Adjust the reference current circuit so as to obtain ASA voltage of 18 mV per EV.
- Refer to "Iref adjustment" in "D, REASSEMBLY AND ADJUSTMENT"

B. Reference voltage circuit

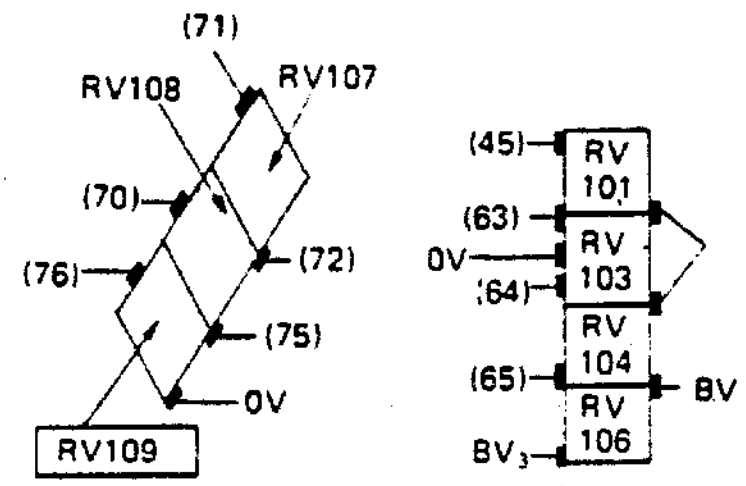


- Adjust RV109 until Vref (75) is set at 1.8V (1.8 V ± 50 mV).
- This serves also as B.C. adjustment. Deviation of the reference voltage causes deviation of the B.C. voltage.
- All the circuit cannot operate normally when Vref deviates from 1.8 V.

(2) Wiring diagram



Reference voltage adjustment

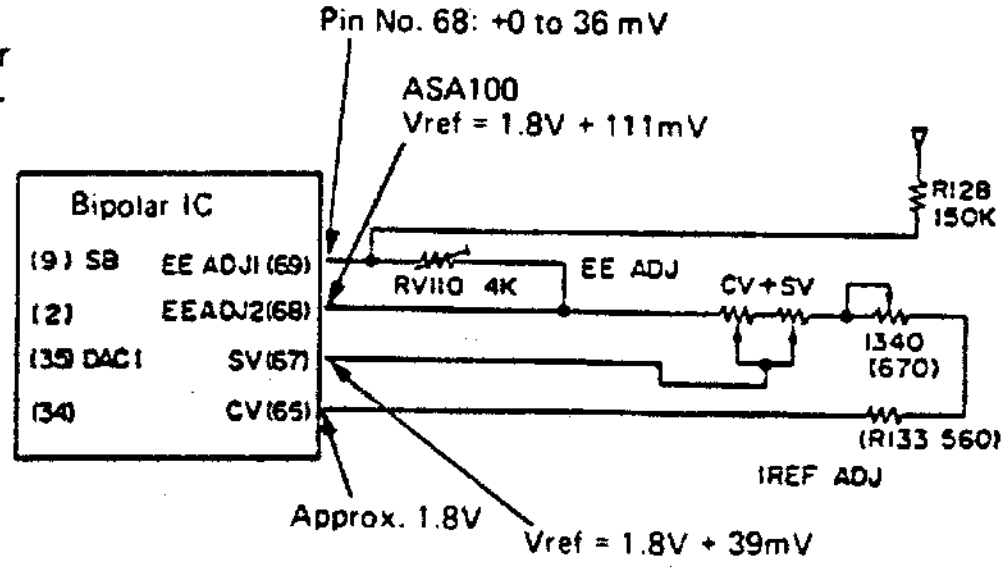


6. CV & SV Circuit: EE Adjusting Circuit

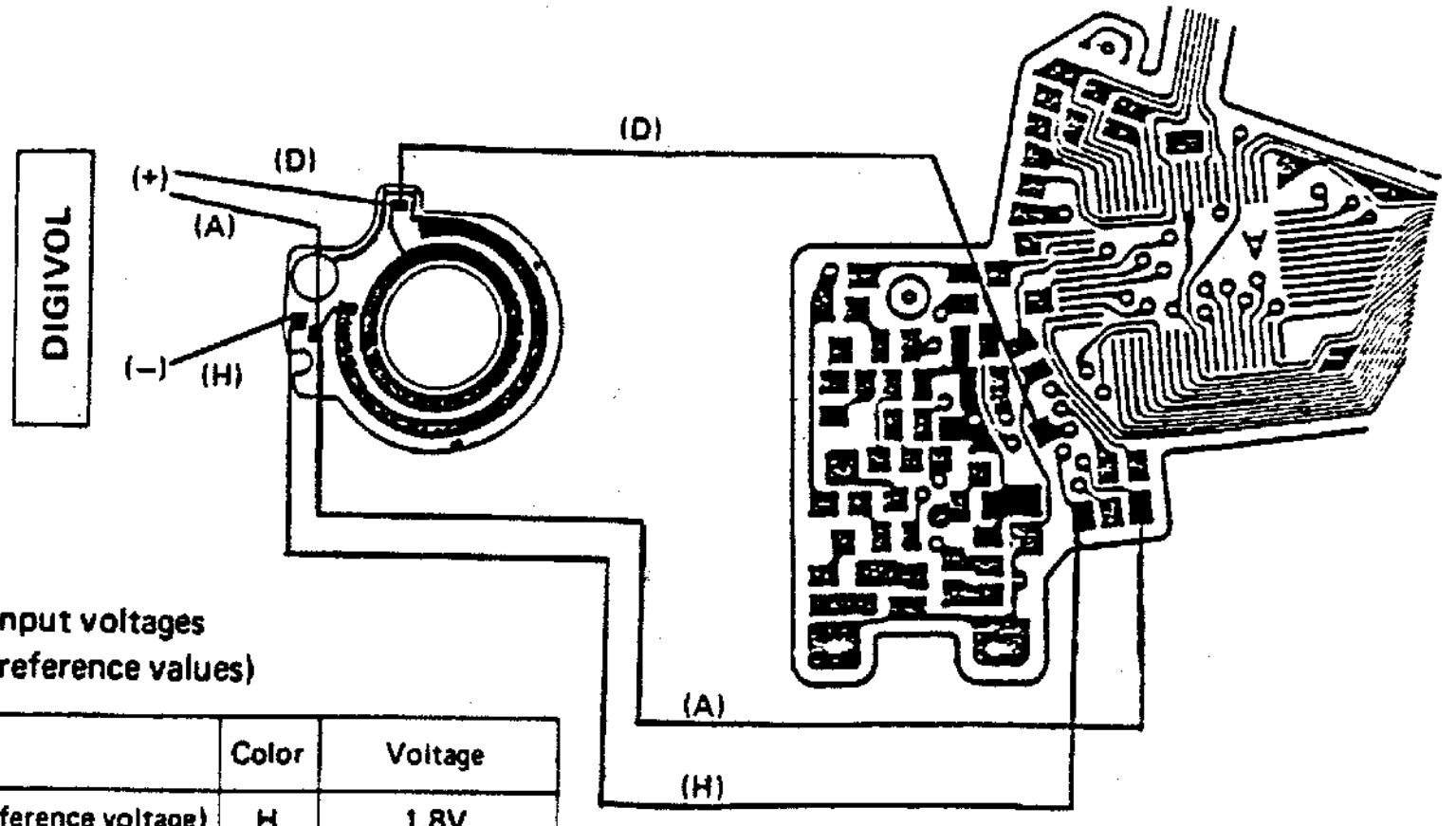
- This is a circuit for ASA level, exposure compensation and inputting data.
- When this circuit becomes defective, indications and exposure time become abnormal (the bar indication is not shifted by changing ASA level).
- Preparations
  1. Measuring instrument: Digivol or circuit tester
  2. Mode: AUTO or MANUAL, B.C.
     - Light the LCD indicator.
     - Attach the lens in position.

(1) Circuit diagram

- ASA resistors
  - High ASA level — High resistor
  - Low ASA level — Low resistor



(2) Wiring diagram

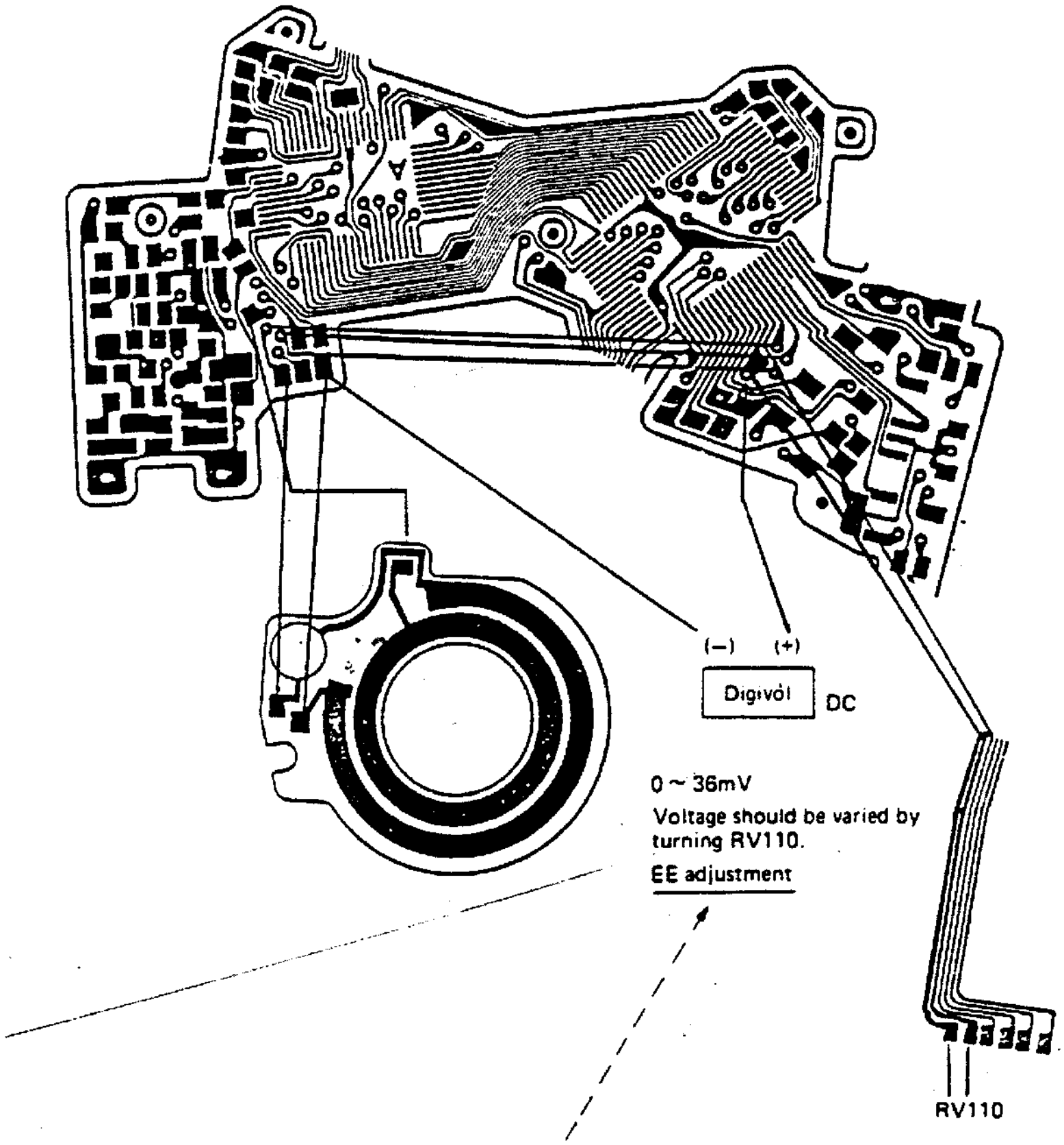


- Input voltages (reference values)

	Color	Voltage
CV: (Reference voltage)	H	1.8V
SV: CV output	D	1.8V + 39mV
Pin No. 68: CV + SV output	A	1.8V + 111mV (ASA100)

- For details, refer to "Iref Adjustment" in "D, REASSEMBLY AND ADJUSTMENT."

(3) Pattern connections between front and rear surfaces



(4) EE adjusting circuit

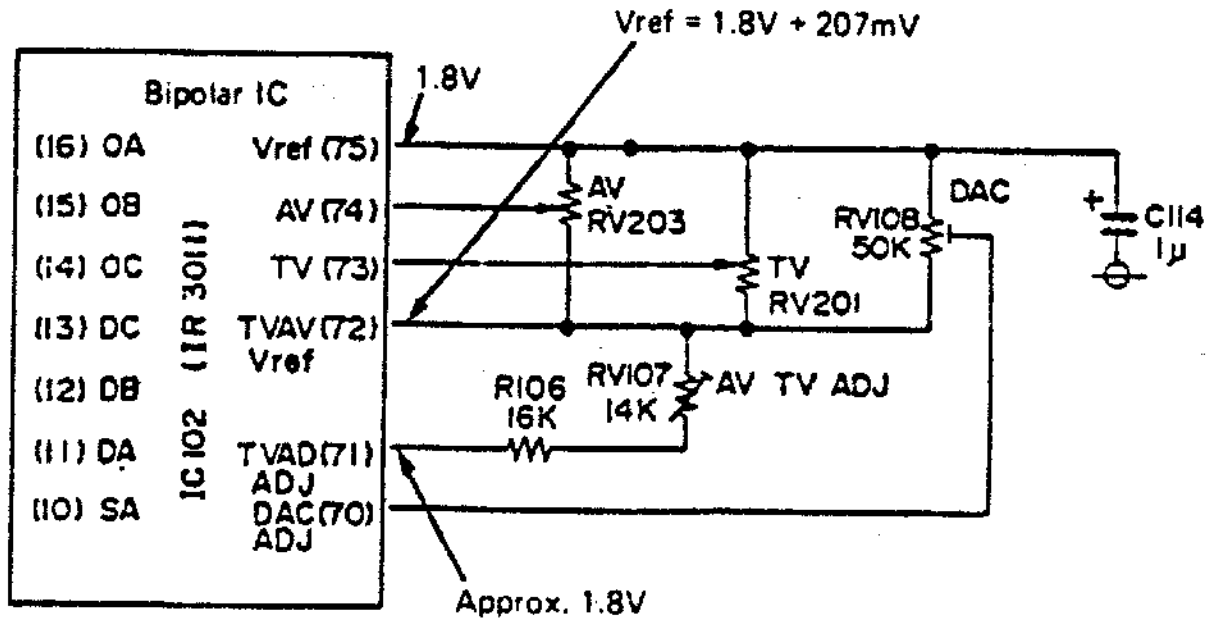
- Take care not to short RV110 to the body.
- Voltage on pin No. 69 should be within a range of 0 to 36 mV taking that on pin No. 68 (blue LW) as standard.

7. TV & AV Circuit

- This is a circuit for adjusting F stop value, shutter time and inputting data.
- When this circuit is defective, shutter time becomes abnormal and the indication within the viewfinder is not changed by manipulating the diaphragm or shutter dial.
- Preparations
  1. Measuring instrument: Digivol or circuit tester
  2. Mode: B.C. or MANUAL
     - Attach MS5014 Lens in position.
     - Light the LCD in the viewfinder.

(1) Circuit diagram

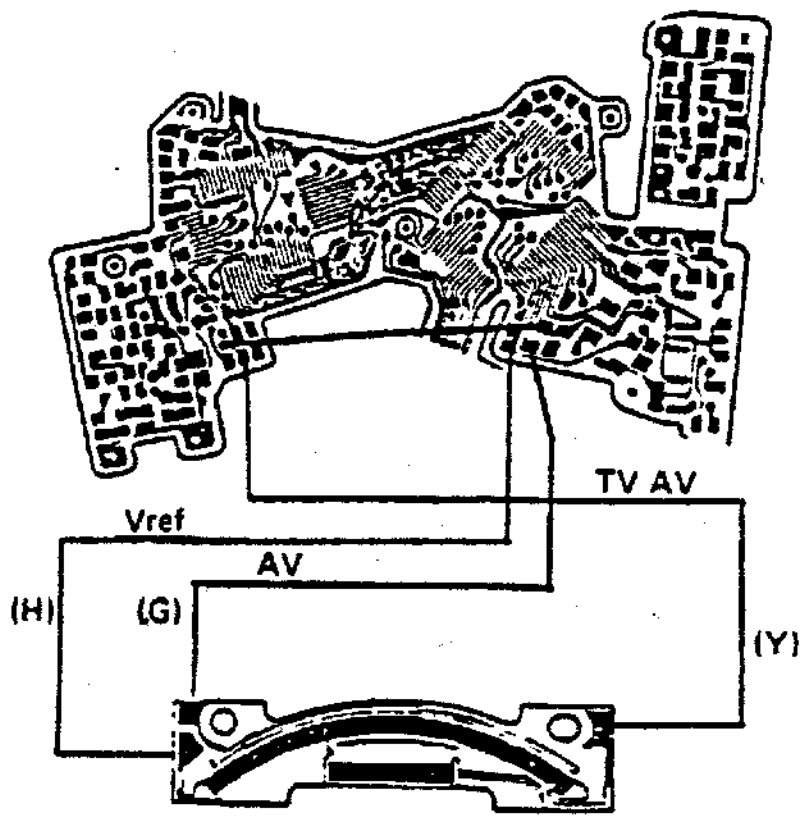
1. AV: F stop value
   - Varied by manipulating the diaphragm.
   - 144 mV with the lens kept open (F1.4).
     Reduced in 18 mV steps by manipulating the diaphragm ring.
2. TV: Shutter time
   Vref = +207 mV at 1 sec.
   Reduced in 18 mV steps.
3. BULB
   The BULB mode is set up when the TV voltage exceeds Vref + 225 mV.



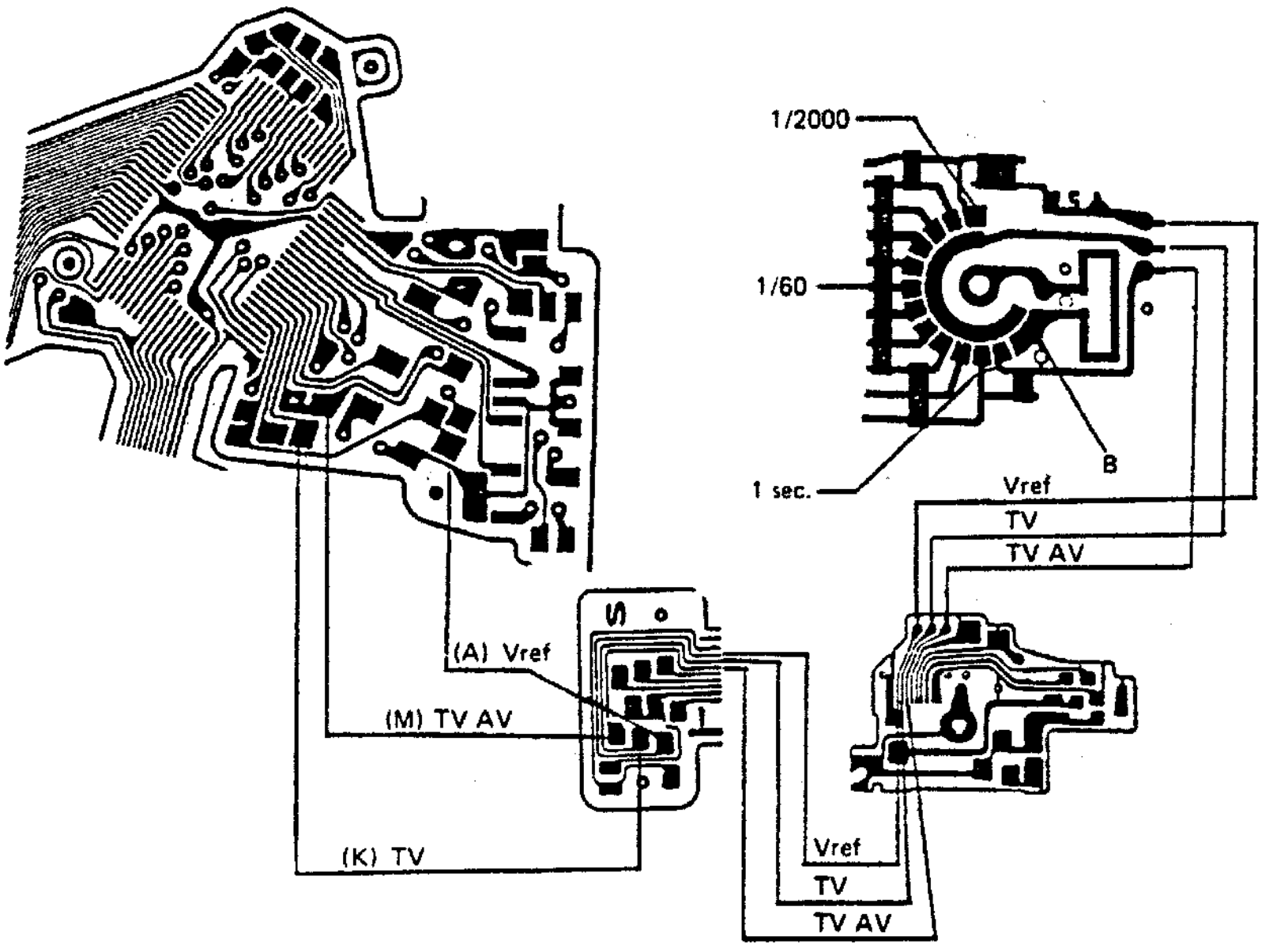
(2) Wiring diagram

A. AV circuit
- Input voltage

	Color	Voltage
Vref	H	1.8V
TV AV	Y	1.8V + 207mV
AV	G	Depending on AV



B. TV circuit



- Input voltage

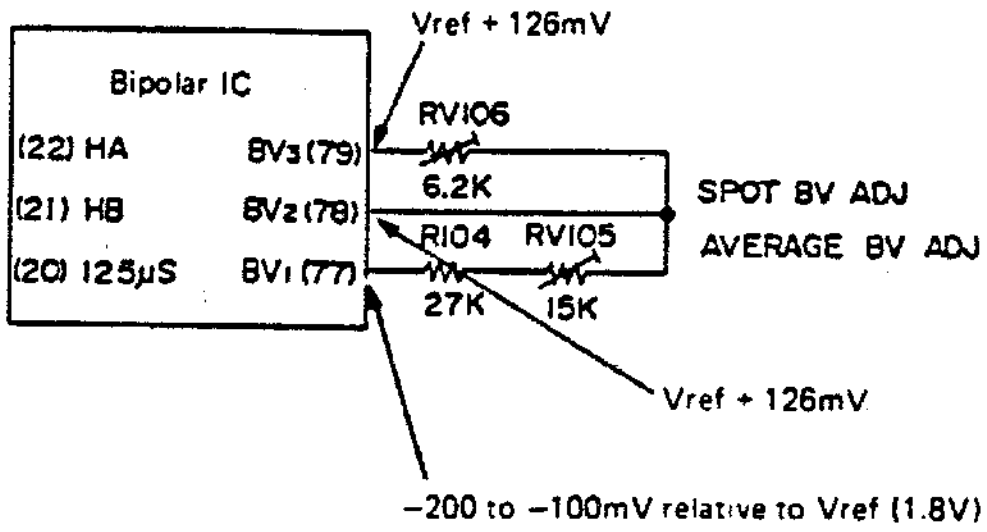
	Color	Voltage
Vref	A	1.8V
TV AV	M	1.8V + 207mV
TV	K	○ Variable depending on shutter time ○ Maximum voltage of 207mV at 1 sec. ○ Minimum voltage of 9mV at 1/2000 (1.8V taken as standard)

8. BV Level Converter Circuit

- This circuit is used for inputting BV voltage at the indicated level to shift BV level.
- When this circuit becomes defective, the bar indication is fixed on the low luminance side.
- Preparations
  1. Measuring instruments: : Digivol or circuit tester
     : Synchroscope
  2. Mode: B.C., AUTO or MANUAL
     : Light the LCD in the viewfinder.
     : Attach the lens in position.

(1) Circuit diagram

: Use a synchroscope for measuring voltage.
: Note that a digital voltmeter provides unstable readings.



(2) Wiring diagram

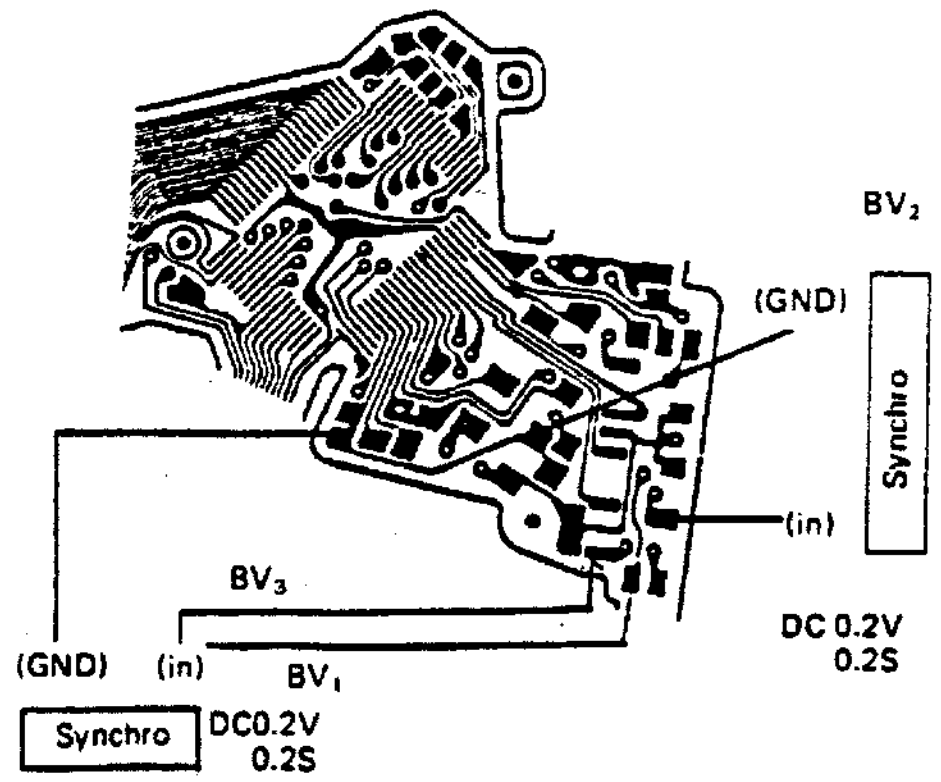
- Voltages
  Each voltage should be measured relative to Vref.
  Each voltage should be measured at BV11 and F5.6.

1. BV1

Average BV: −170 ± 25 mV
SPOT BV: −150 ± 25 mV

2. BV2
   +126 mV

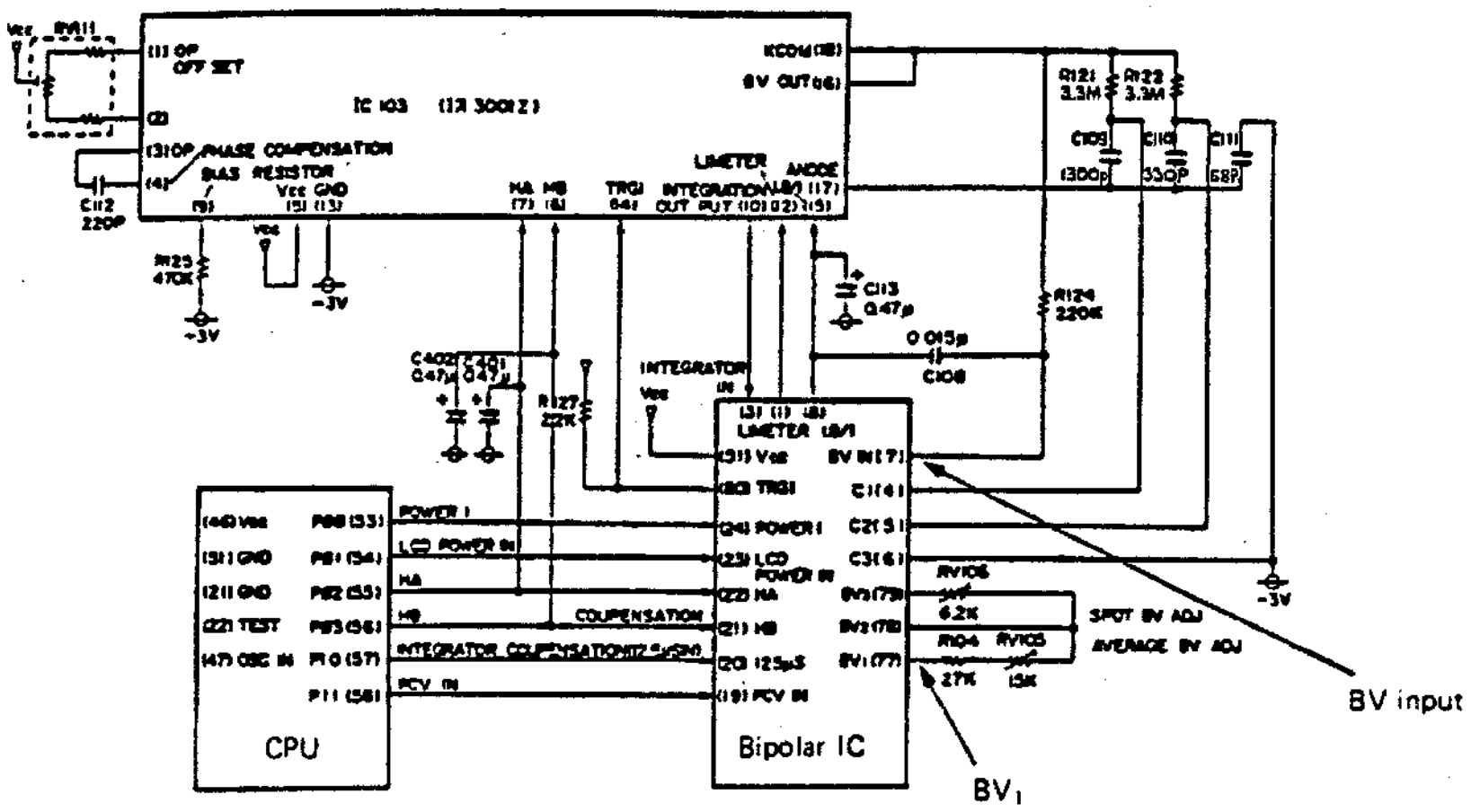
3. BV3
   +126 mV



9. Head Amplifier

- The head amplifier should be checked during indication and during exposure respectively.

(1) Circuit diagram



- Voltages

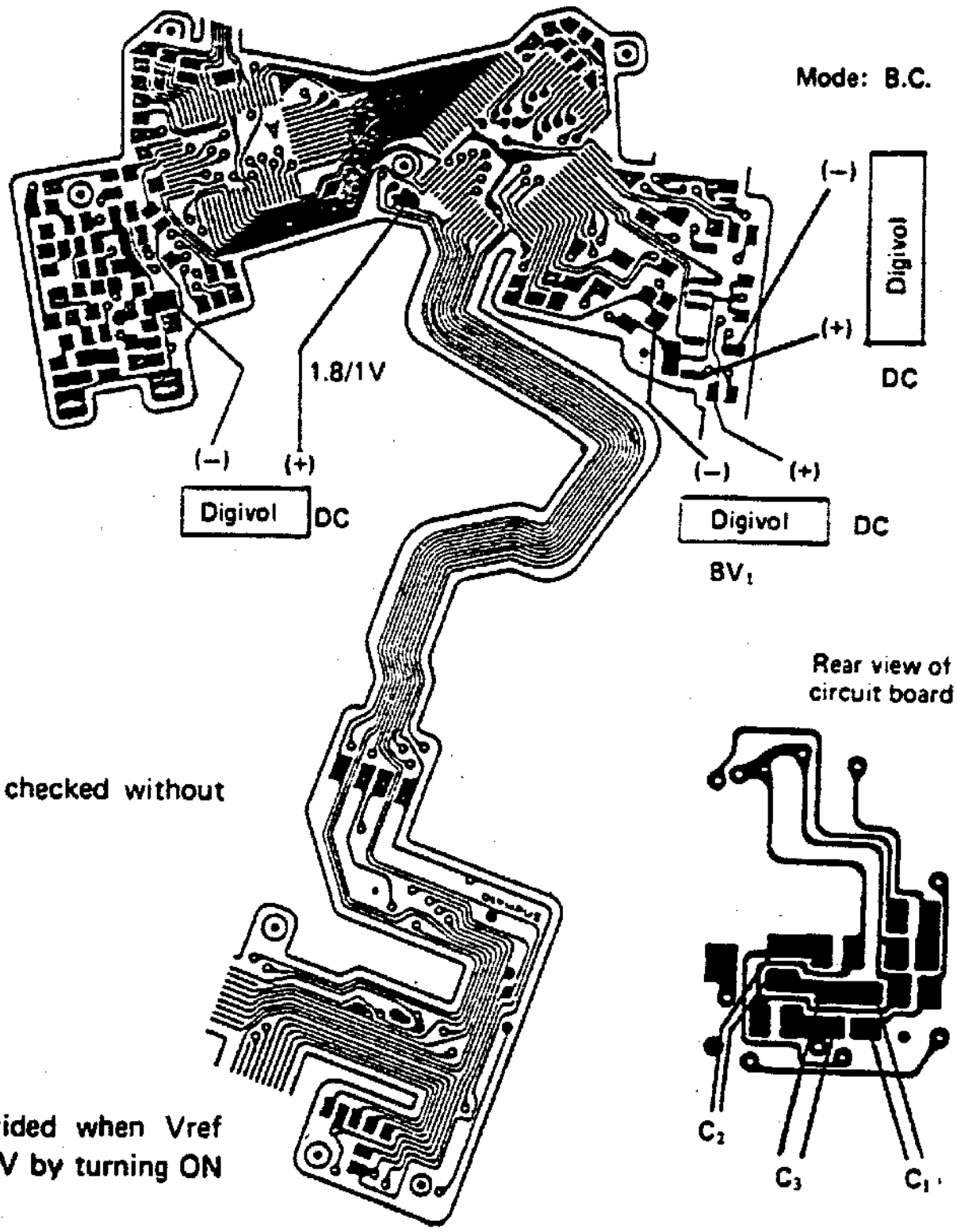
A: During indication ○ Reference voltage during indication: 1.8V ± 50mV

	HA	HB	1.8/1V	Bias voltage	BV	BV_1
IC leg No.	7	6	12	9	18	Bipolar IC (77)
Voltage	3V	3V	1.8V	0V	−200 ~ −100mV	−200 ~ −100mV

B: During exposure (AUTO) ○ Reference voltage during exposure: 1V ± 0.1V

	HA	HB	1.8/1V	Bias voltage	Trg	Integral	ANODE
IC leg No.	7	6	12	9	14	10	17
Voltage	3V	0V	1V	–	–	1.0 ~ 1.6V	–

(2) Wiring diagram



A. Vref 1.8/1 V only can be checked without detaching the front plate:
   - Vref 1.8/1V
     - 1.8 V during indication
     - 1 V during exposure

B. Indirect checks

1. HB voltage
   - The HB voltage is provided when Vref changes from 1.8 V to 1 V by turning ON of the main switch.

2. HA voltage
   - The HA voltage is provided when the voltage applied across both ends of BV3 changes from 0 V to 25 mV by switching from AVERAGE to SPOT.
   - Mode: B.C.

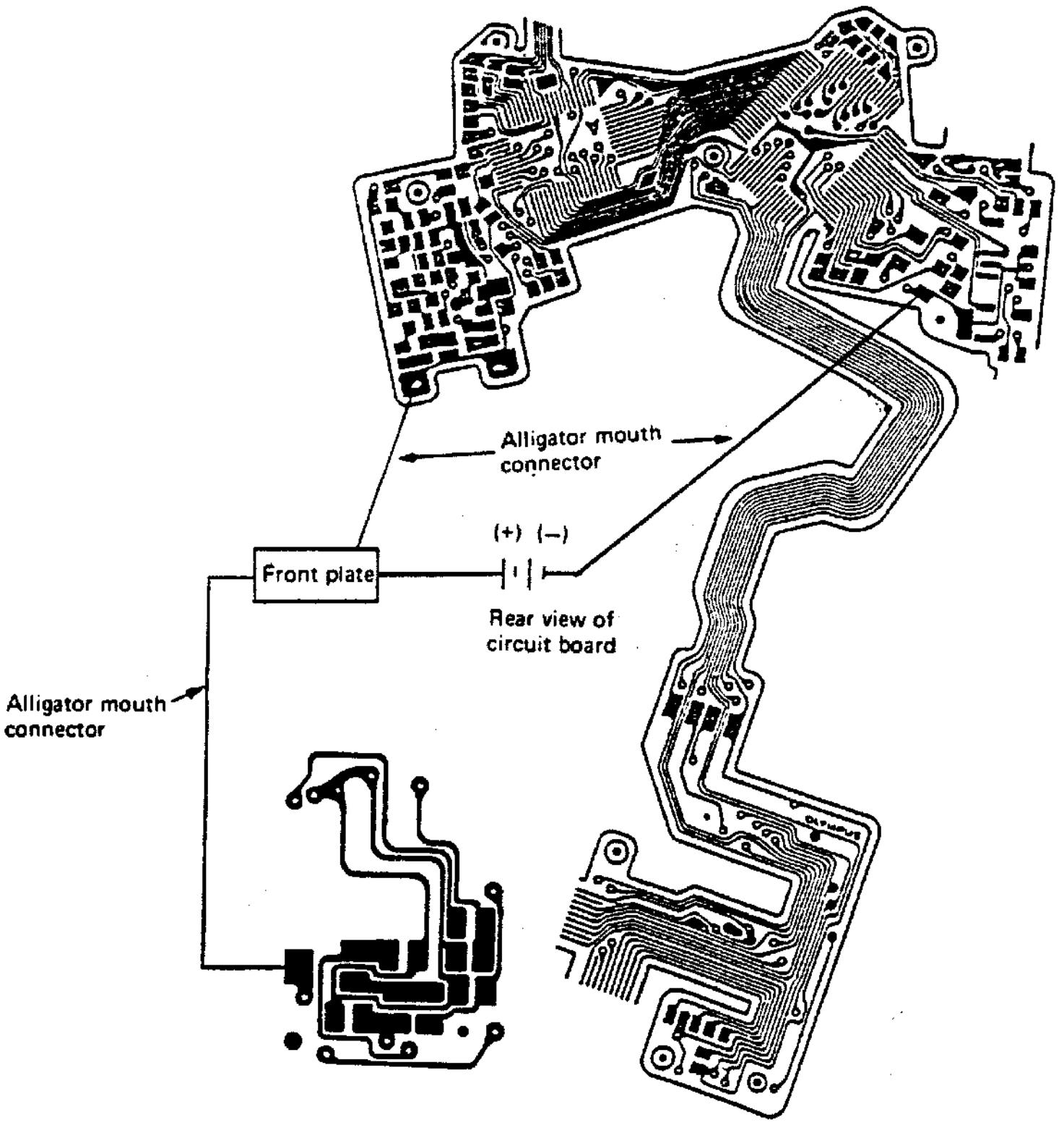
3. BV output voltage
   - The BV output of the head amplifier can be judged by measuring voltage at BV1.
   - The BV output of the head amplifier is nearly the same as the output voltage of BV1.

C. The other items should be checked after removing Araldite from the IC legs.
The front plate should be detached for the checks.

D. C_1, C_2 and C_3 are variable depending on ASA level.

Classification	ASA	Integrating capacitor
High ASA	320 ~ 3200	C_3
Medium ASA	40 ~ 250	$C_2 + C_3$
Low ASA	6 ~ 32	$C_1 + C_2 + C_3$

(3) Procedures to obtain indication after detaching the front plate from the camera body

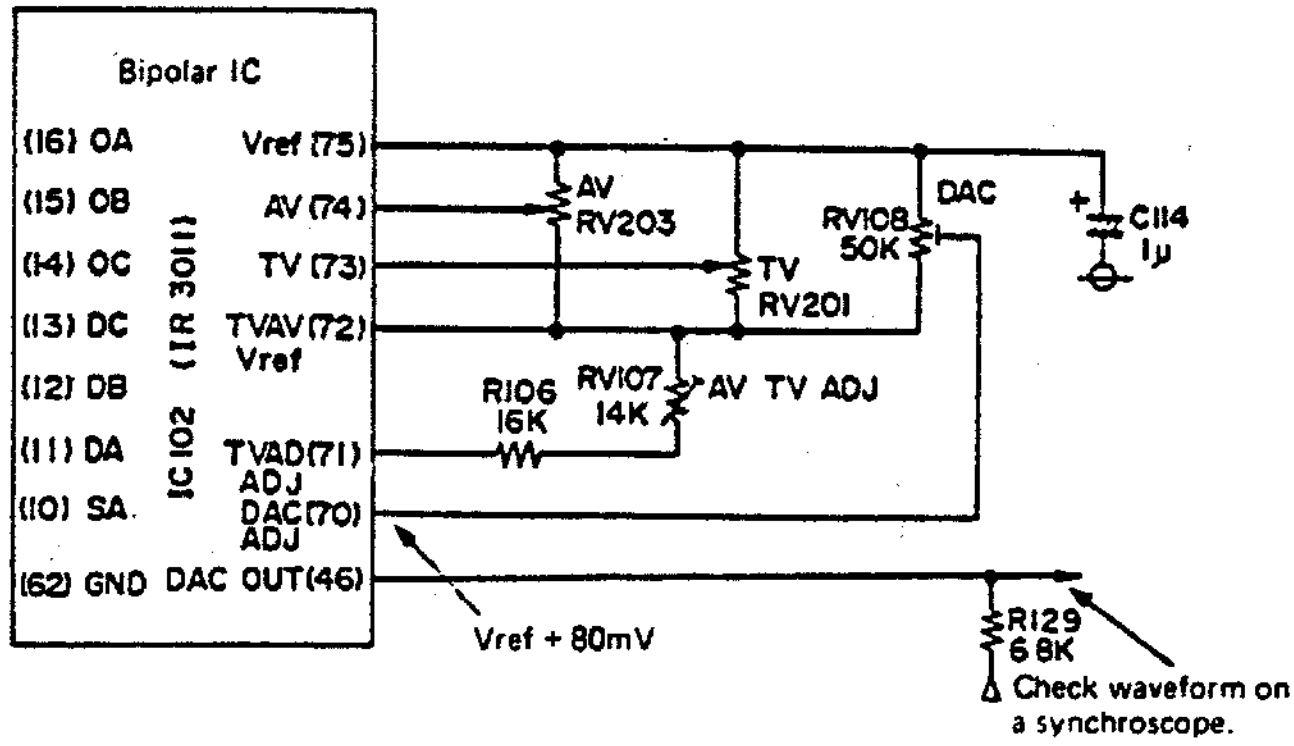


- After detaching the front plate
  1. Use a jig battery.
  2. Apply a positive voltage to the M circuit board.
     Connect the camera body to the M circuit board using alligator mouth connectors.
  3. Apply a positive voltage to the head amplifier.
     Connect the camera body to the M circuit board using alligator mouth connectors.
  4. Apply a negative voltage to the M circuit board.

10. DAC Circuit

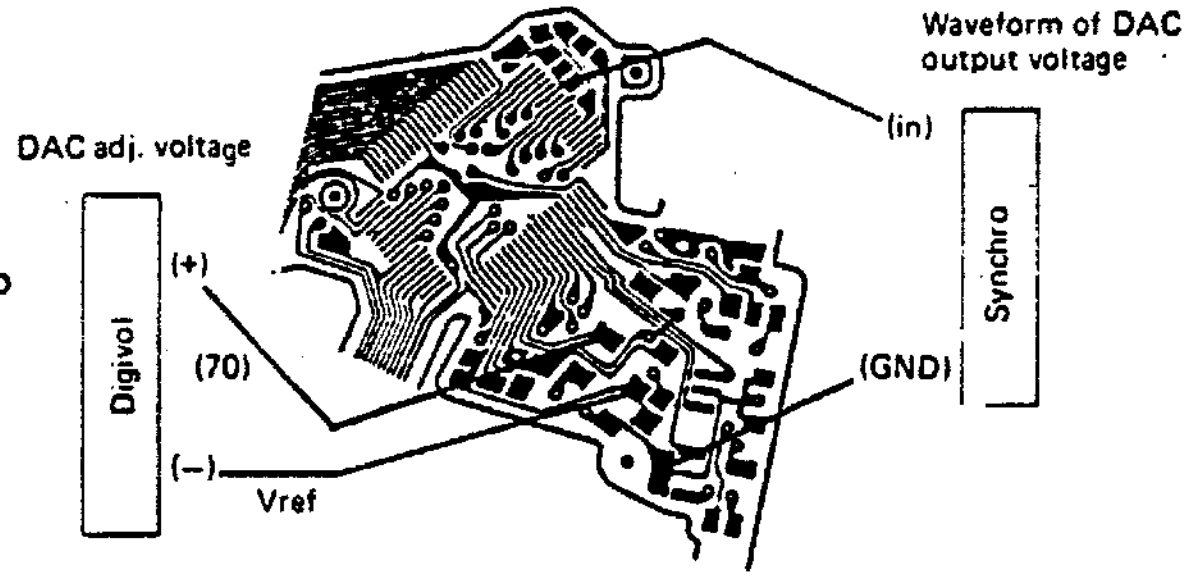
(1) Circuit diagram

- For voltages, refer to "DAC Adjustment" in "D. REASSEMBLY AND ADJUSTMENT"
- The DAC voltage is 18 mV per EV.

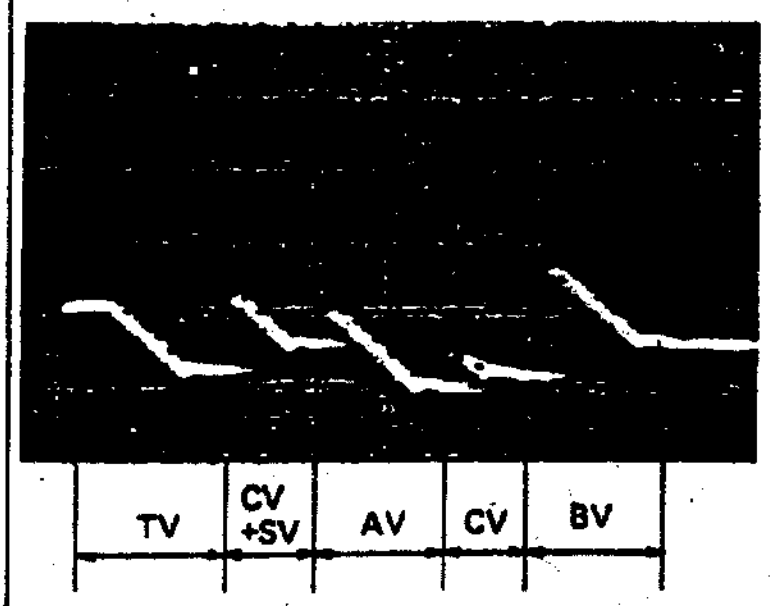


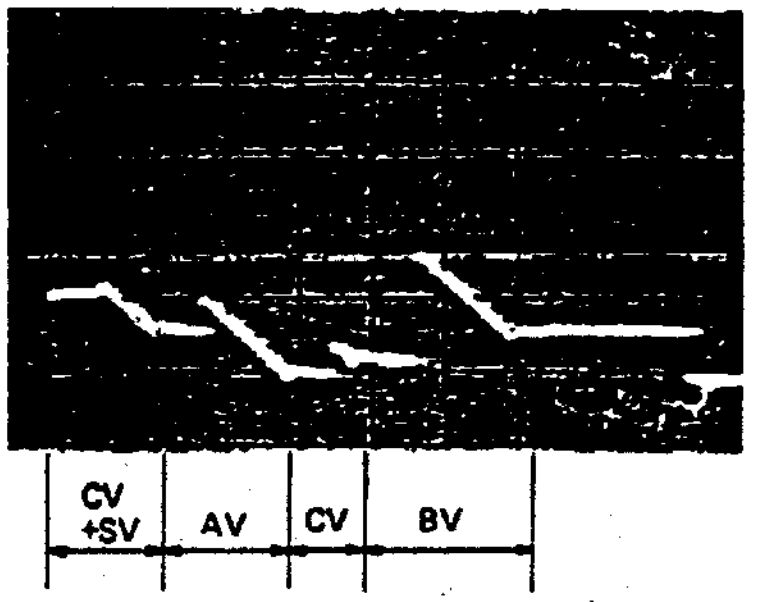
(2) Wiring diagram

- DAC output voltage
  - TV: Shutter speed
  - SV: ASA sensitivity
  - AV: F stop value
  - CV: Exposure correction
  - BV: Luminance of object to be photographed



1. MANUAL mode	• + − = 0 • ASA 100 • Lens diaphragm set at F11 or F16 • 1/2000	2. AUTO mode	• + − = 0 • ASA 100 • Lens diaphragm set at F11 or F16
DC 0.2V 5ms		DC 0.2V 5ms	



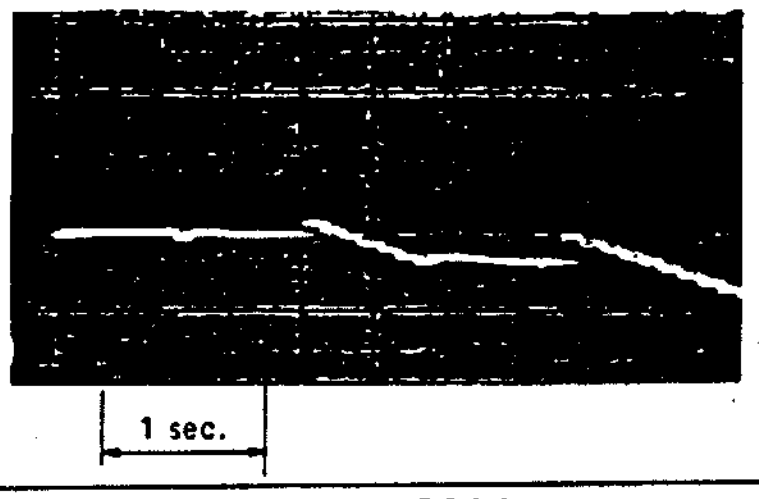


3. Variation depending on shutter time

- MANUAL mode
- ASA 100
- + – = 0

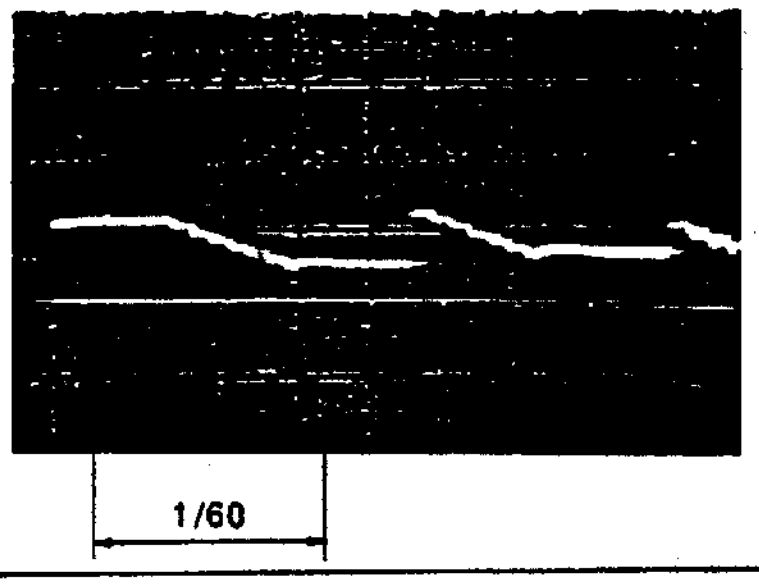
(1) 1 sec.

- DC 0.2V
- 2ms



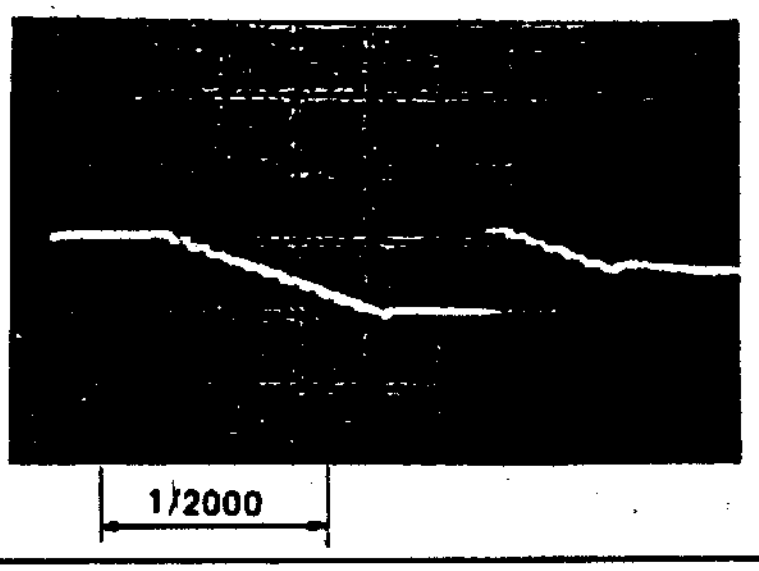
(2) 1/60 sec.

- DC 0.2V
- 2ms



(3) 1/2000 sec.

- DC 0.2V
- 2ms

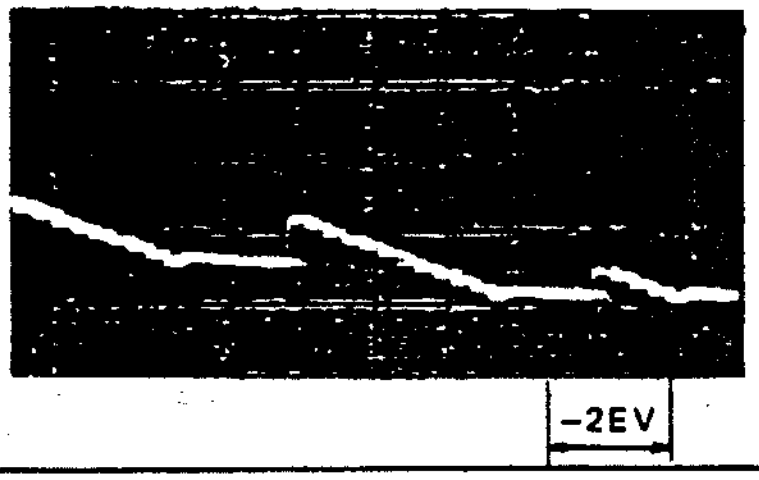


4. Variation depending on exposure correction

- AUTO mode
- ASA 100
- Lens diaphragm set at F11 or F16

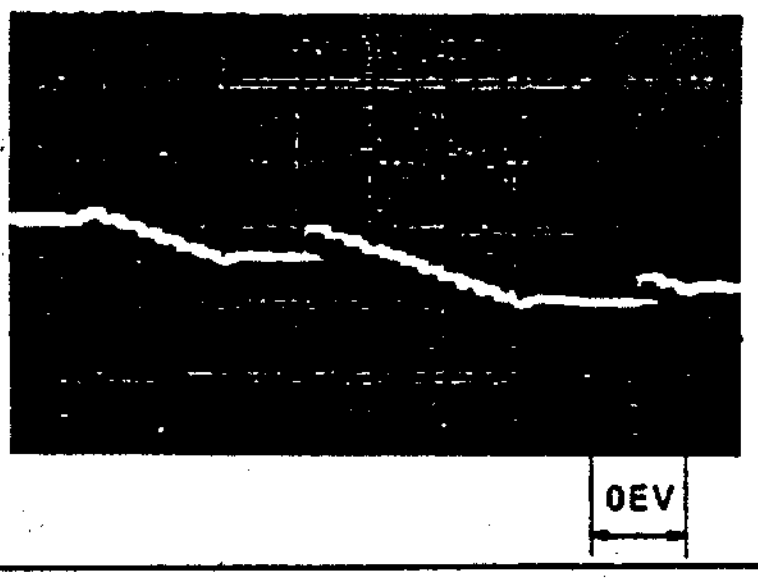
(1) (+ –) Minus side

- DC 0.2V
- 2ms



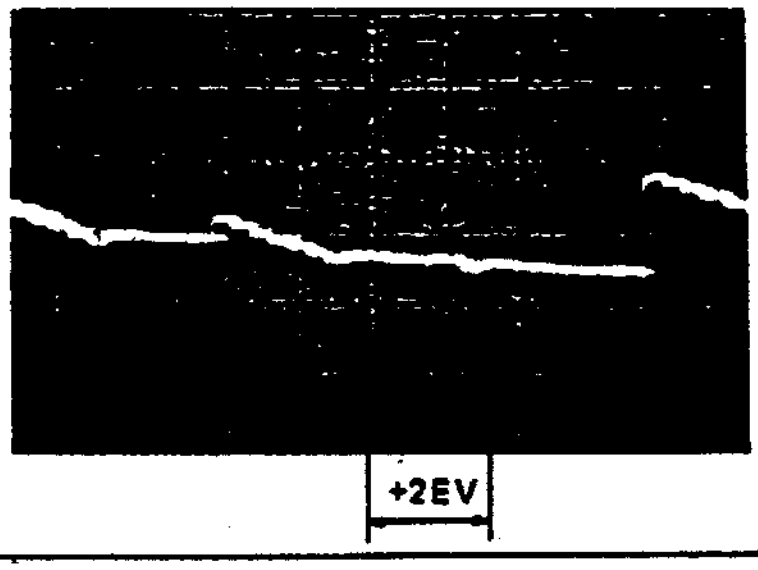
(2) (+ –) 0

- DC 0.2V
- 2ms.



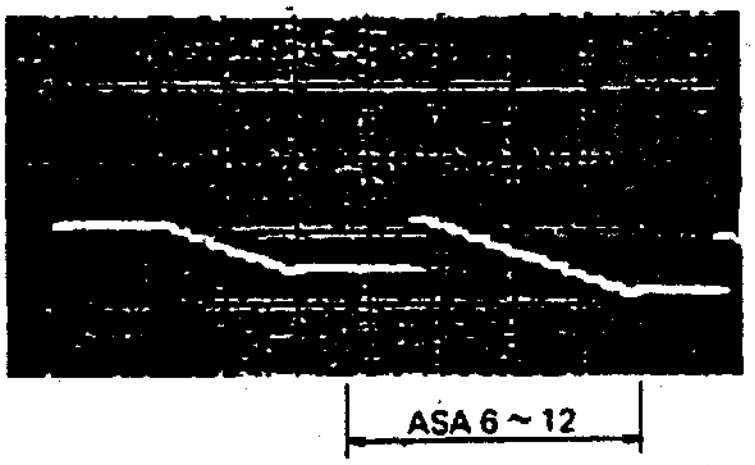
(3) (+ –) Plus side

- DC 0.2V
- 2ms

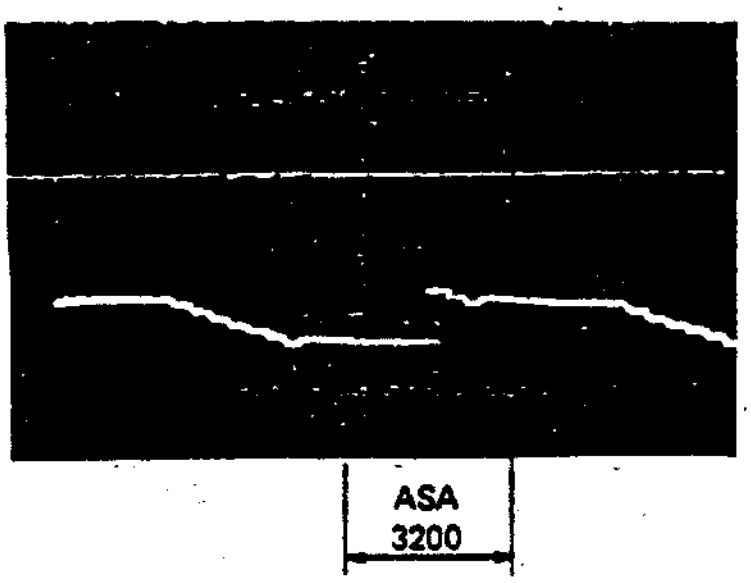


5. Variation depending on ASA level
- MANUAL mode
- + – = 0
- 1/60

(1) Low ASA
- DC 0.2V
- 2ms

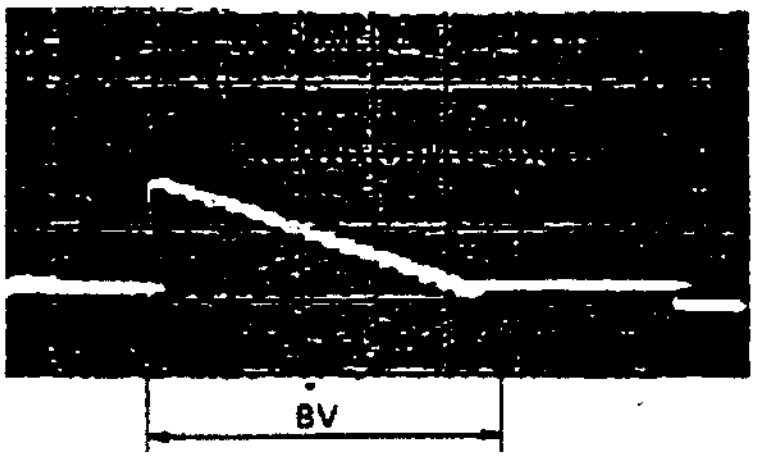


(2) High ASA
- DC 0.2V
- 2ms

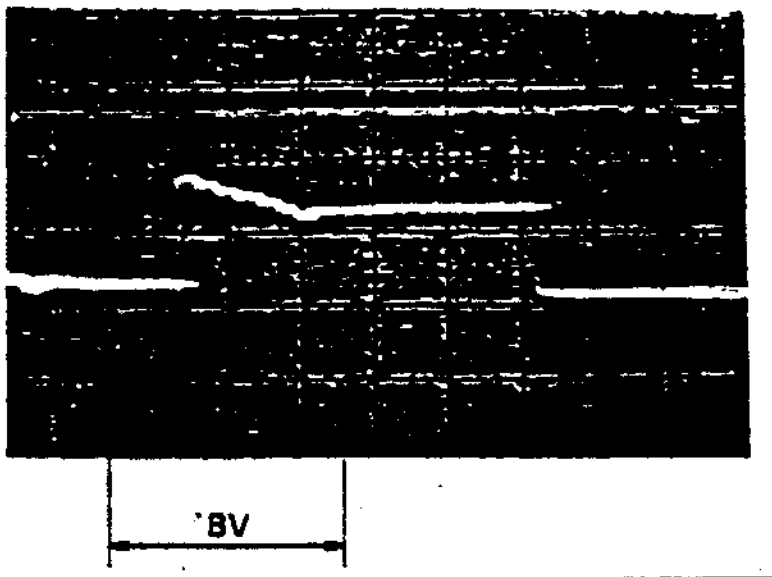


6. Variation depending on luminance
- AUTO mode
- ASA 100
- + – = 0

(1) Low luminance
- DC 0.2V
- 2ms

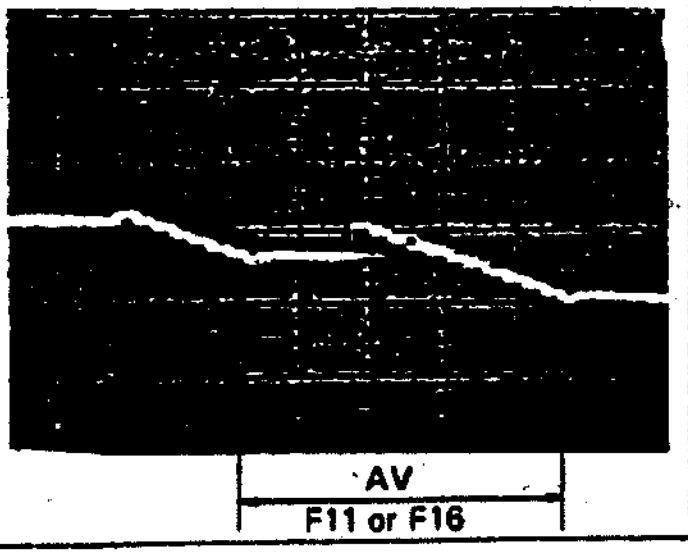


(2) High luminance
- DC 0.2V
- 2ms

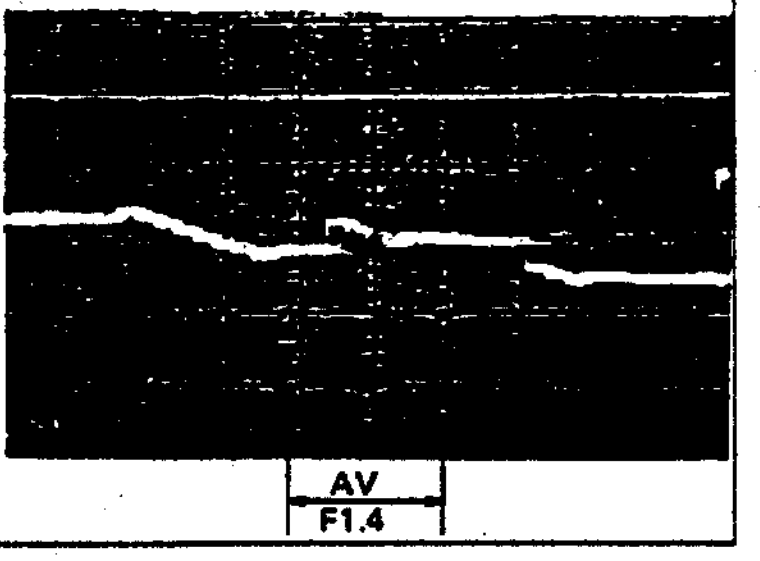


7. Variation depending on stop value
- AUTO mode
- ASA 100
- (+ –) 0
- DC 0.2mV
- 2ms

(1) Stop-down condition

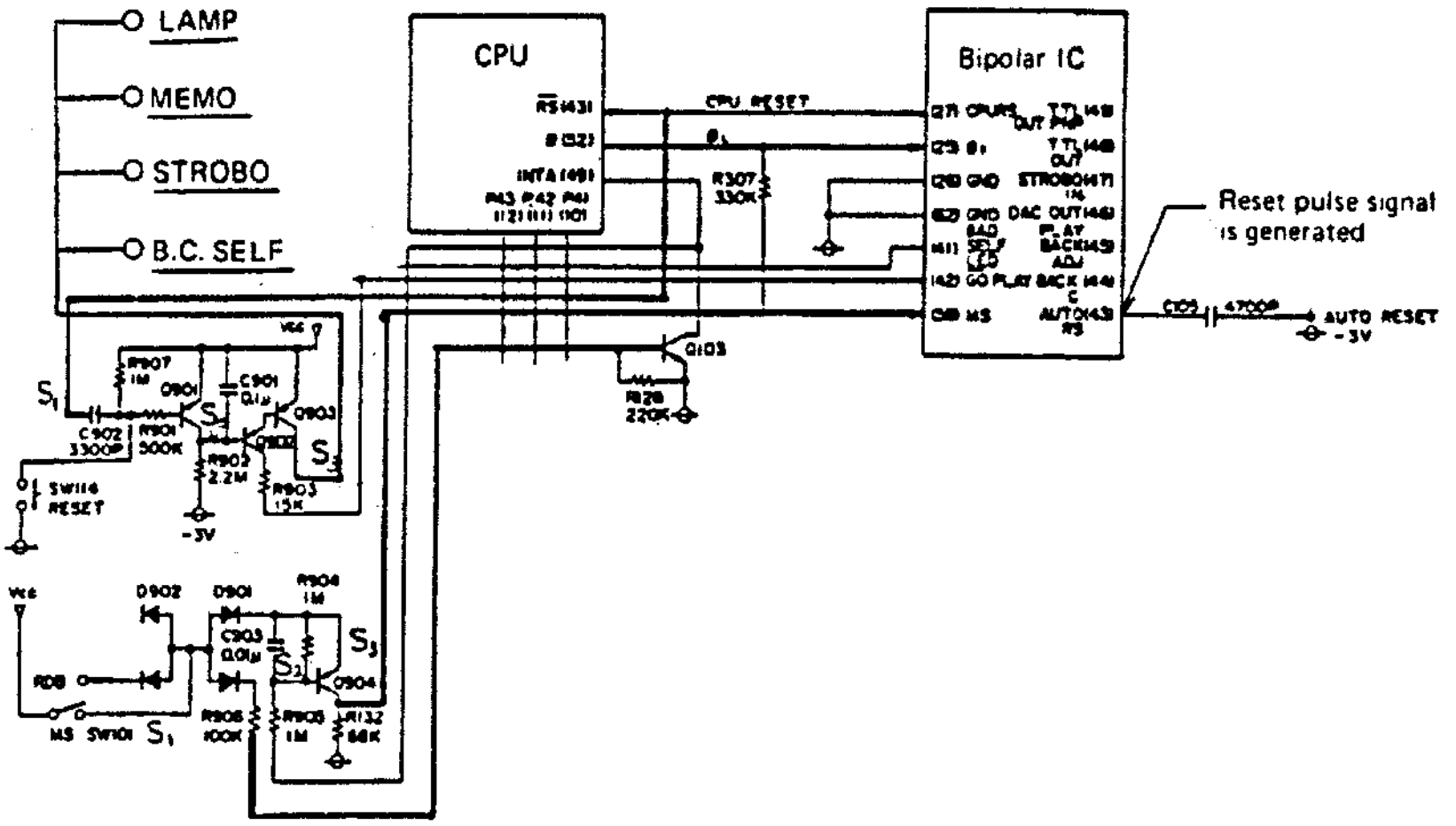


(2) Open condition



11. Reset Circuit and Flash Misjudgement Preventive Circuit

(1) Circuit diagram

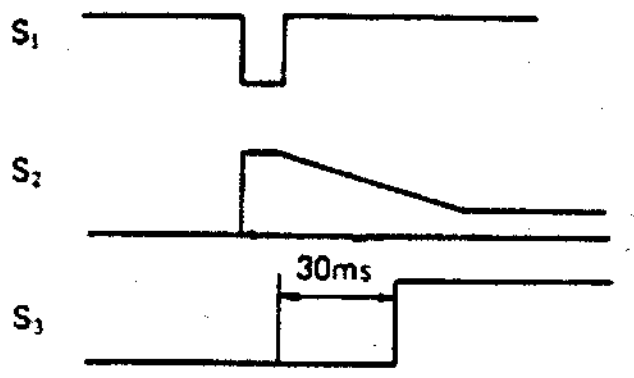


A. Reset circuit

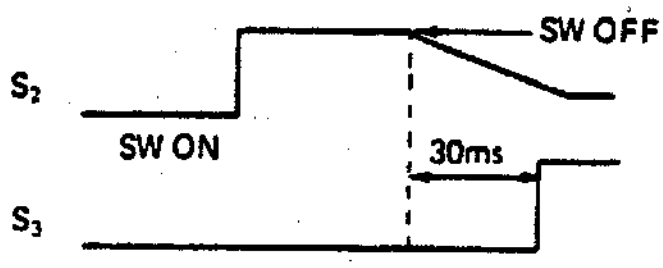
- The reset circuit forcibly extinguishes the LED, etc. sequentially for about 30 ms after the shutter is locked till power supply voltage is restored to the required level to turn it ON.
  C105 is charged when battery voltage becomes lower than 2.65 V and discharges when voltage is restored to 2.91 V.
  Accordingly, the pulse signal is generated and inputted into C902 in the reset circuit to extinguish the LED, etc.
- Check waveform of the voltage on a synchroscope.

Time Chart

(Auto reset)

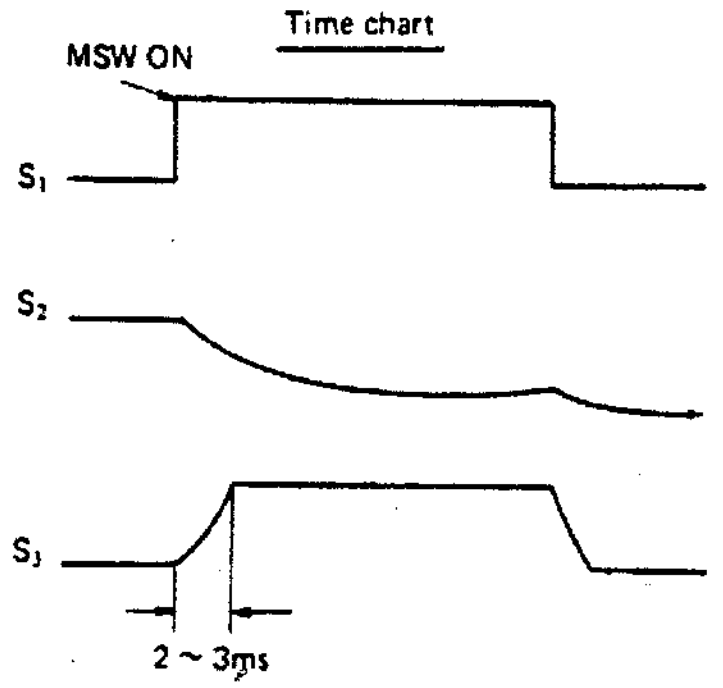


(Reset upon changing mode)



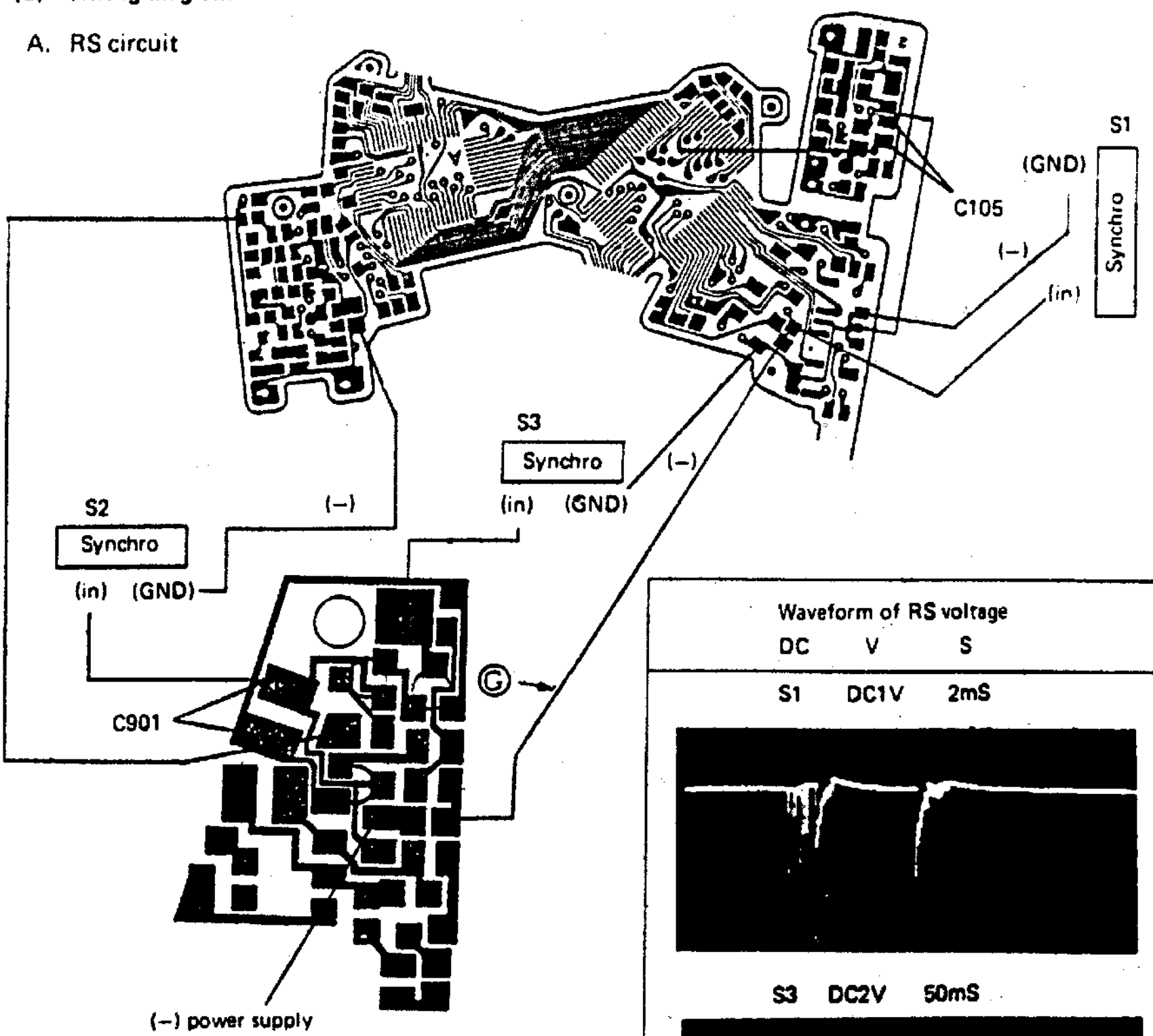
B. Flash misjudgement preventive circuit

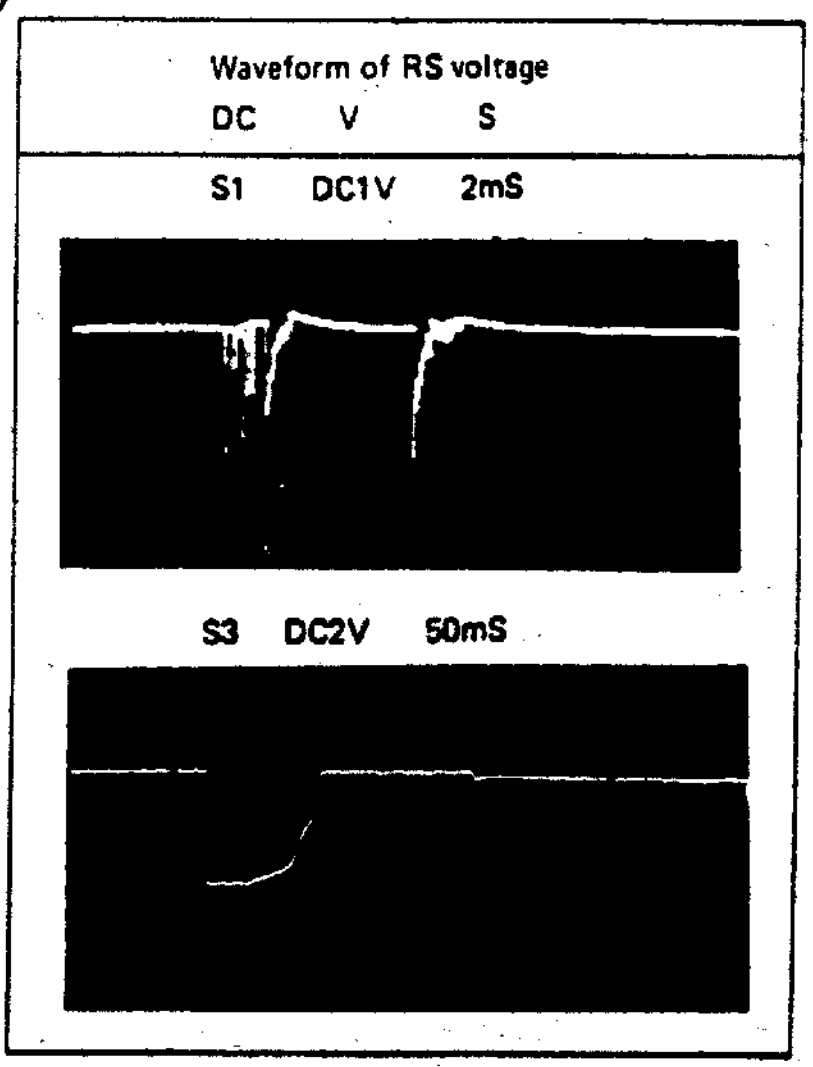
- This circuit prevents the strobe from being flashed erroneously by misjudgement of shutter speed of 1/125 for 1/60.
- The circuit operates when the main switch is turned ON.
- Check voltages with a synchroscope:



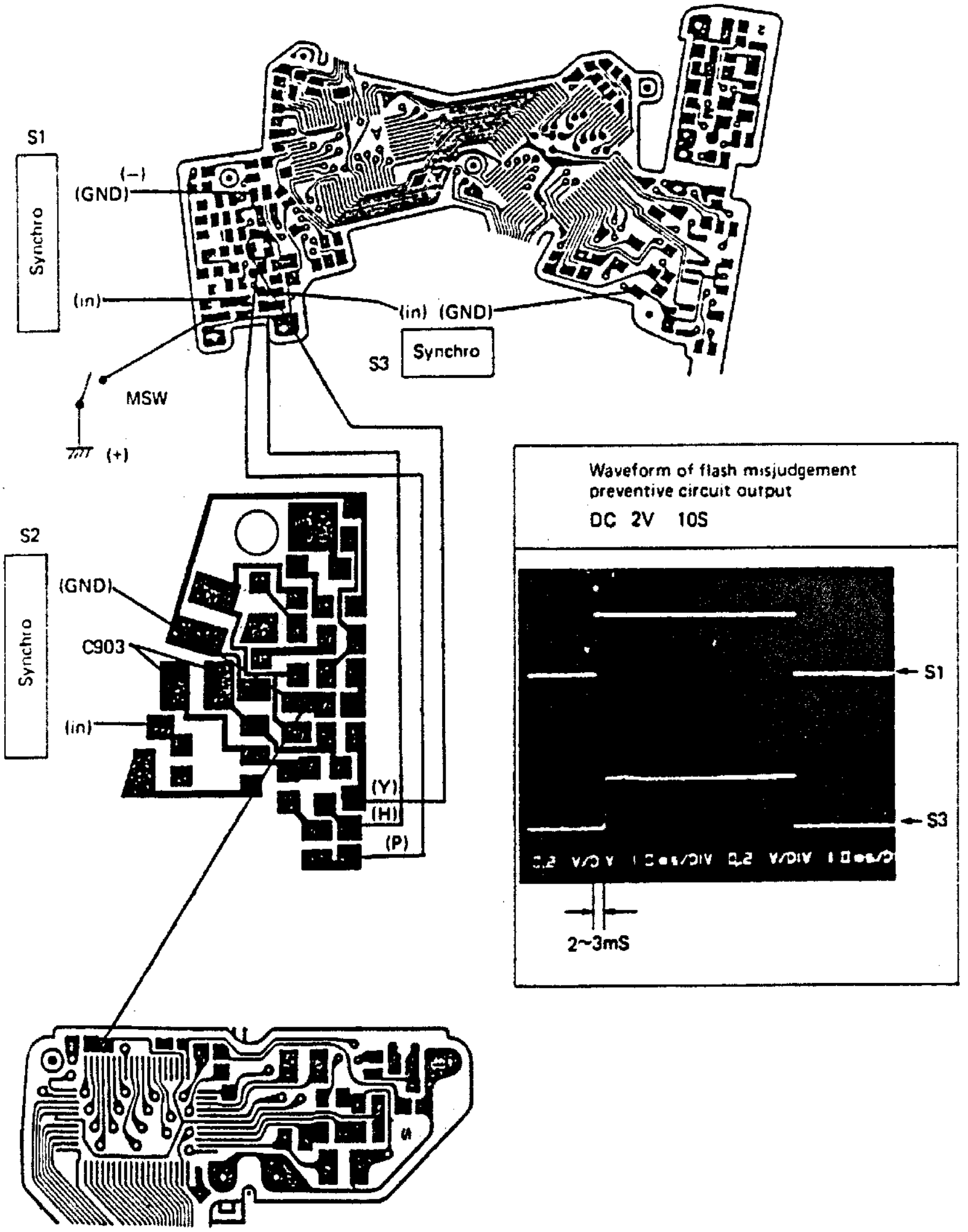
(2) Wiring diagram

A. RS circuit





B. Flash misjudgement preventive circuit

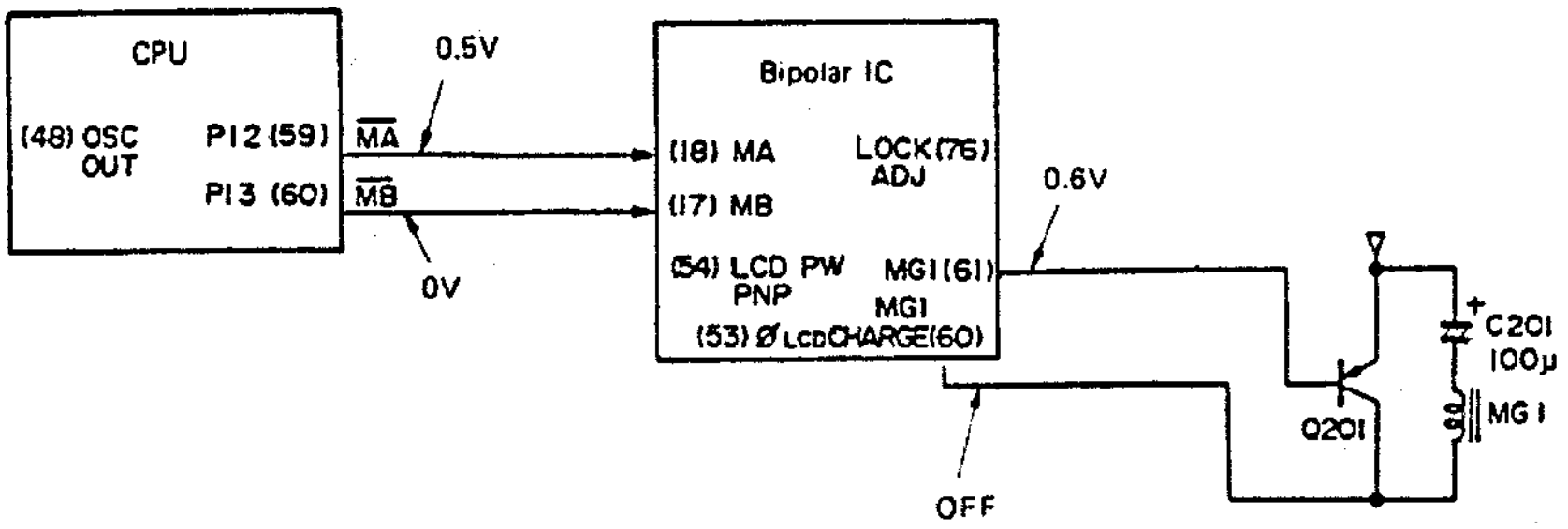


12. MG1 Drive Circuit

(1) Circuit diagram

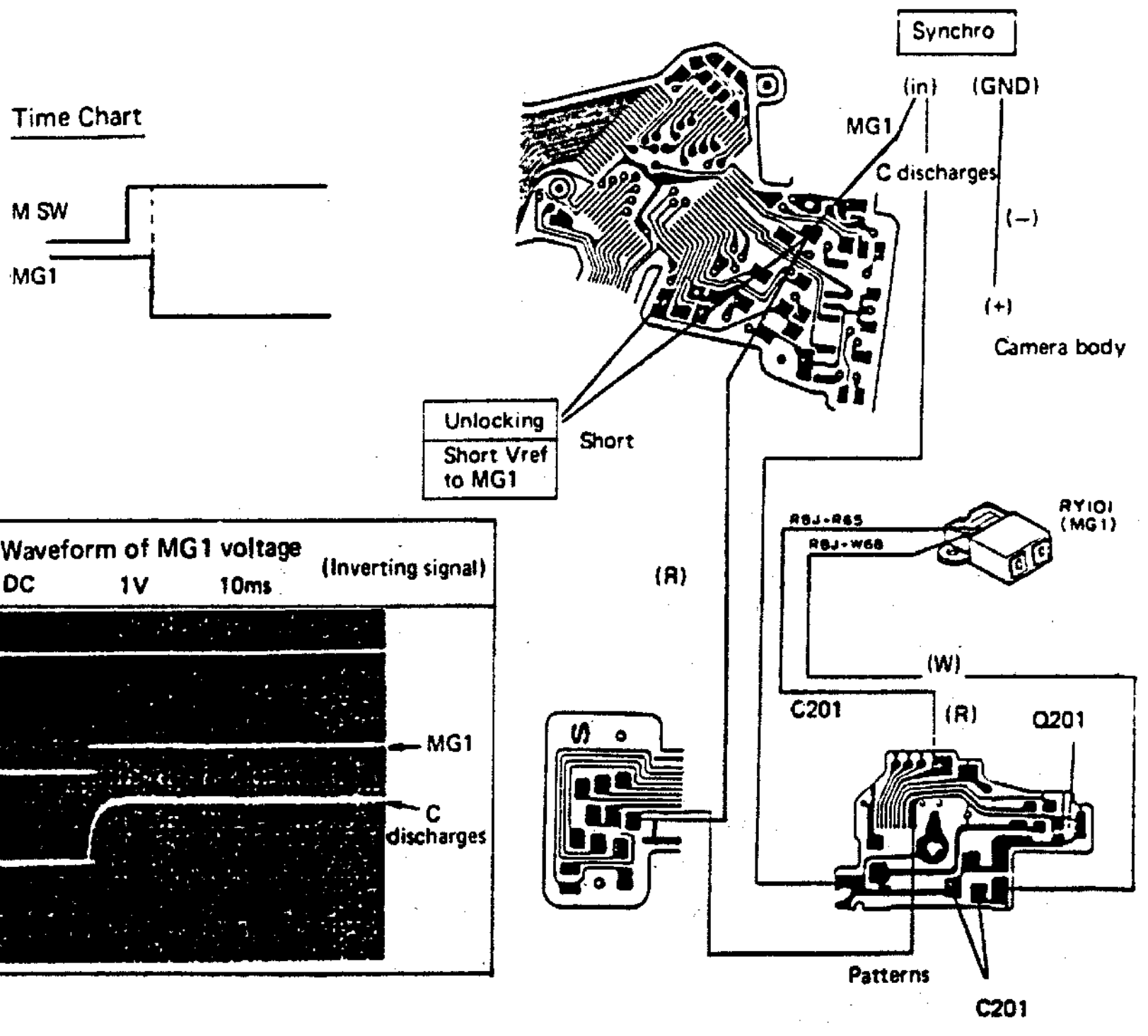
- When the main switch is turned ON, the MA and MB signals are provided, and MG1 is driven.

- Preparations
  1. Measuring instrument: Synchroscope
  2. Mode: AUTO or MANUAL
  3. Checks upon releasing the shutter



(2) Wiring diagram

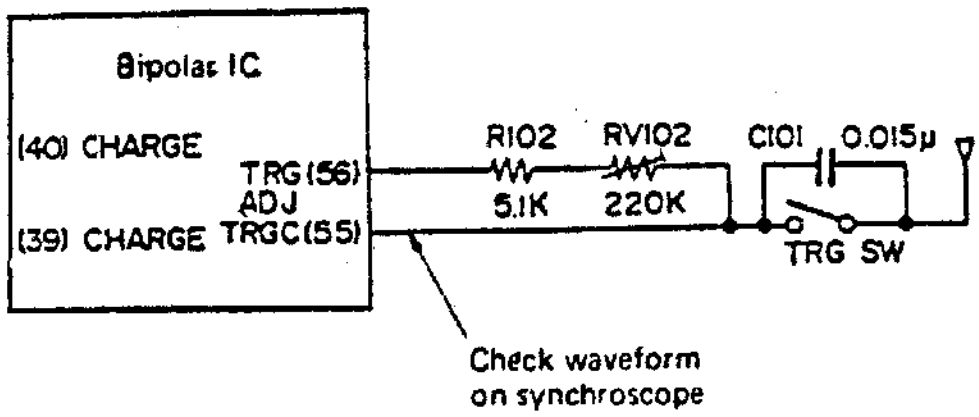
- Measure voltages with a synchroscope.
- Set the camera in the AUTO or MANUAL mode.



13. Trigger Drive Circuit

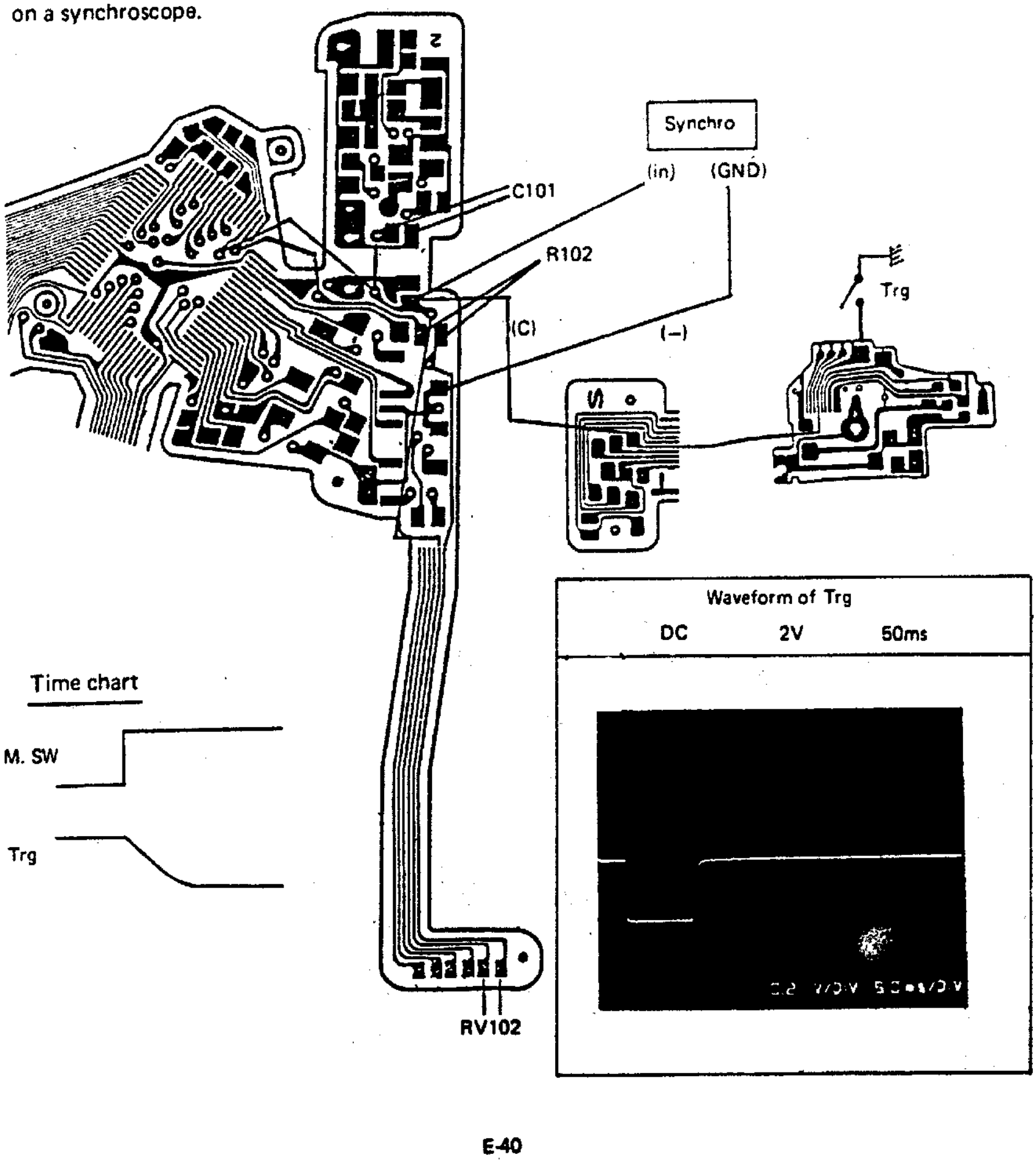
(1) Circuit diagram

- Preparations
  1. Measuring instrument: Synchroscope
  2. Mode: AUTO or MANUAL
  3. Measure voltages upon releasing the shutter.



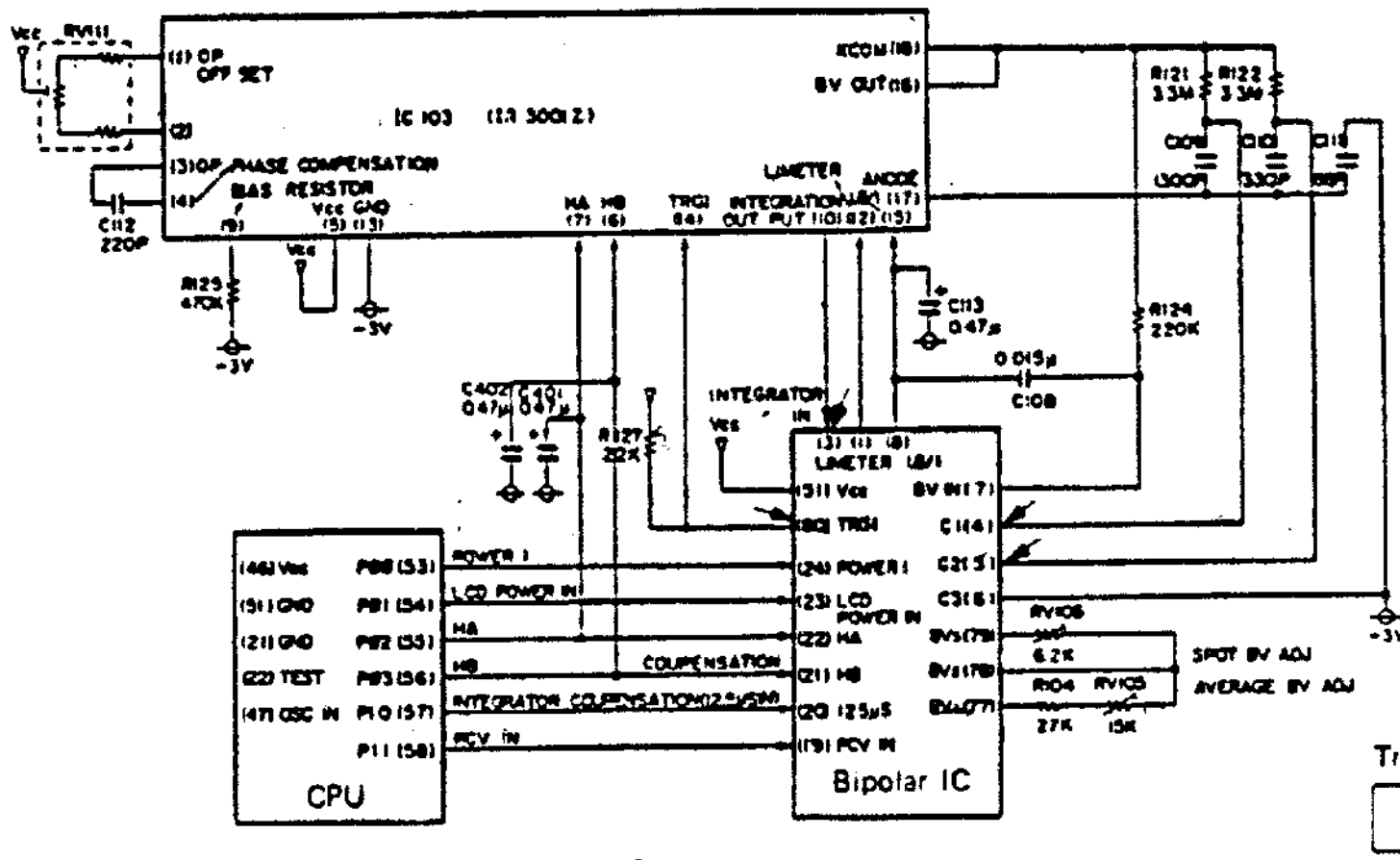
(2) Wiring diagram

- Check voltage waveforms on a synchroscope.



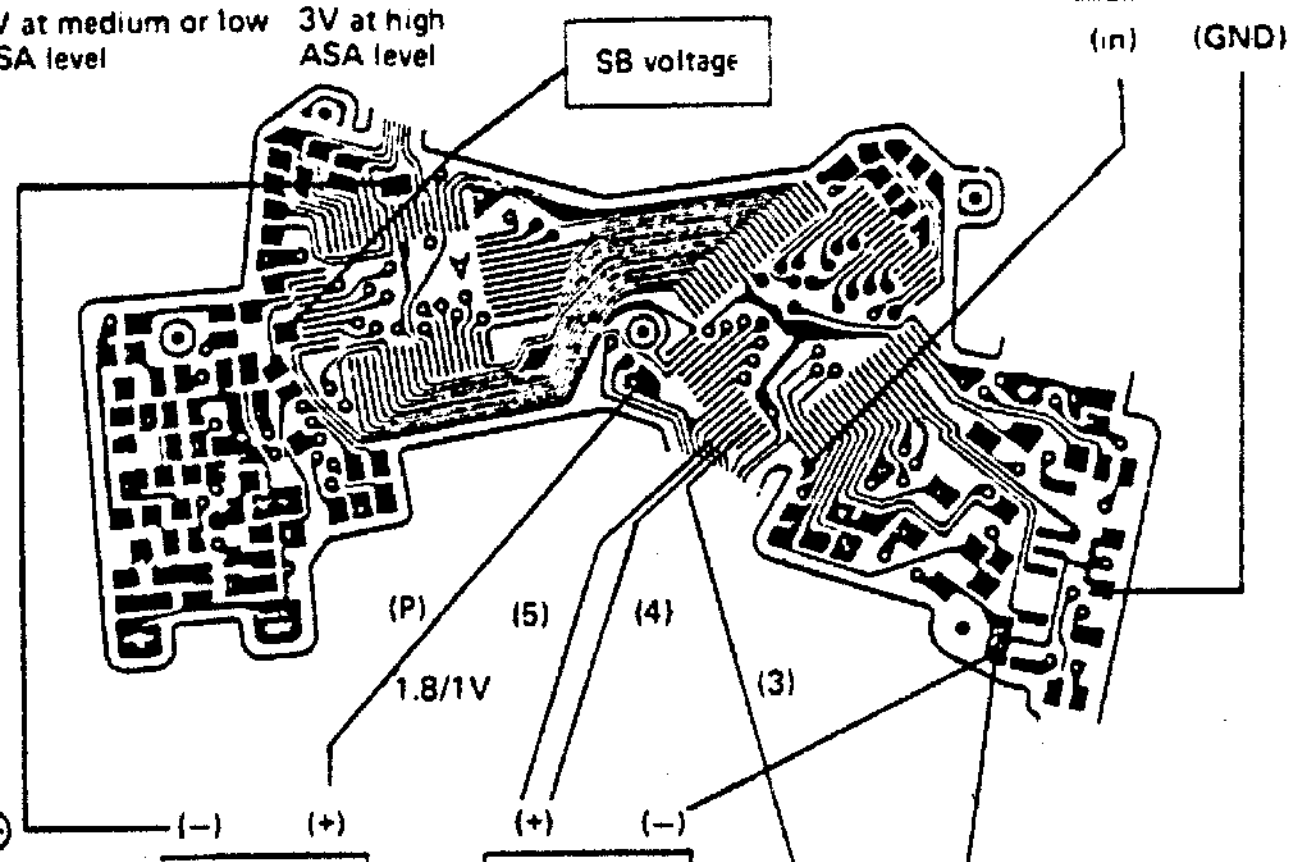
14. Head Amplifier (Exposure)

(1) Circuit diagram



0V at medium or low ASA level

3V at high ASA level



(2) Wiring diagram

1. Switching of Vref 1.8/1
   1 V when the main switch is turned ON.
2. Switching of C value
   - AUTO mode
   - Main switch ON
   - Voltage on legs Nos 4 and 5.

ASA	4	5
High	OFF	OFF
Medium	OFF	0
Low	0	0

(Unit: V)

* SB voltage is 3 V at high ASA level, and 0 V at medium or low ASA level

3. Integral voltage
   - AUTO mode
   - On pin No. 3 of the bipolar IC
   - Check waveform with a synchroscope.

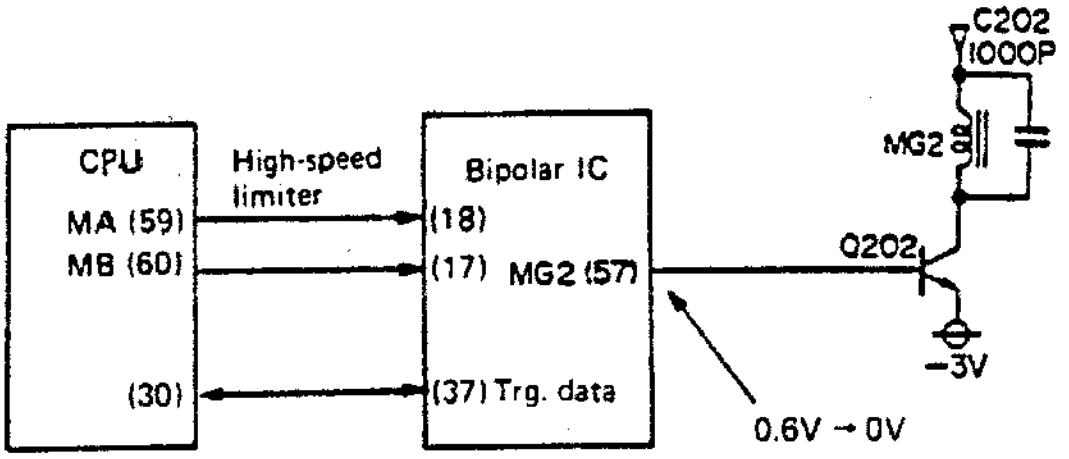
4. Trg signal
   - AUTO mode
   - On pin No. 80 of the bipolar IC
   - Check waveform with a synchroscope.

   * Check waveform at R127.

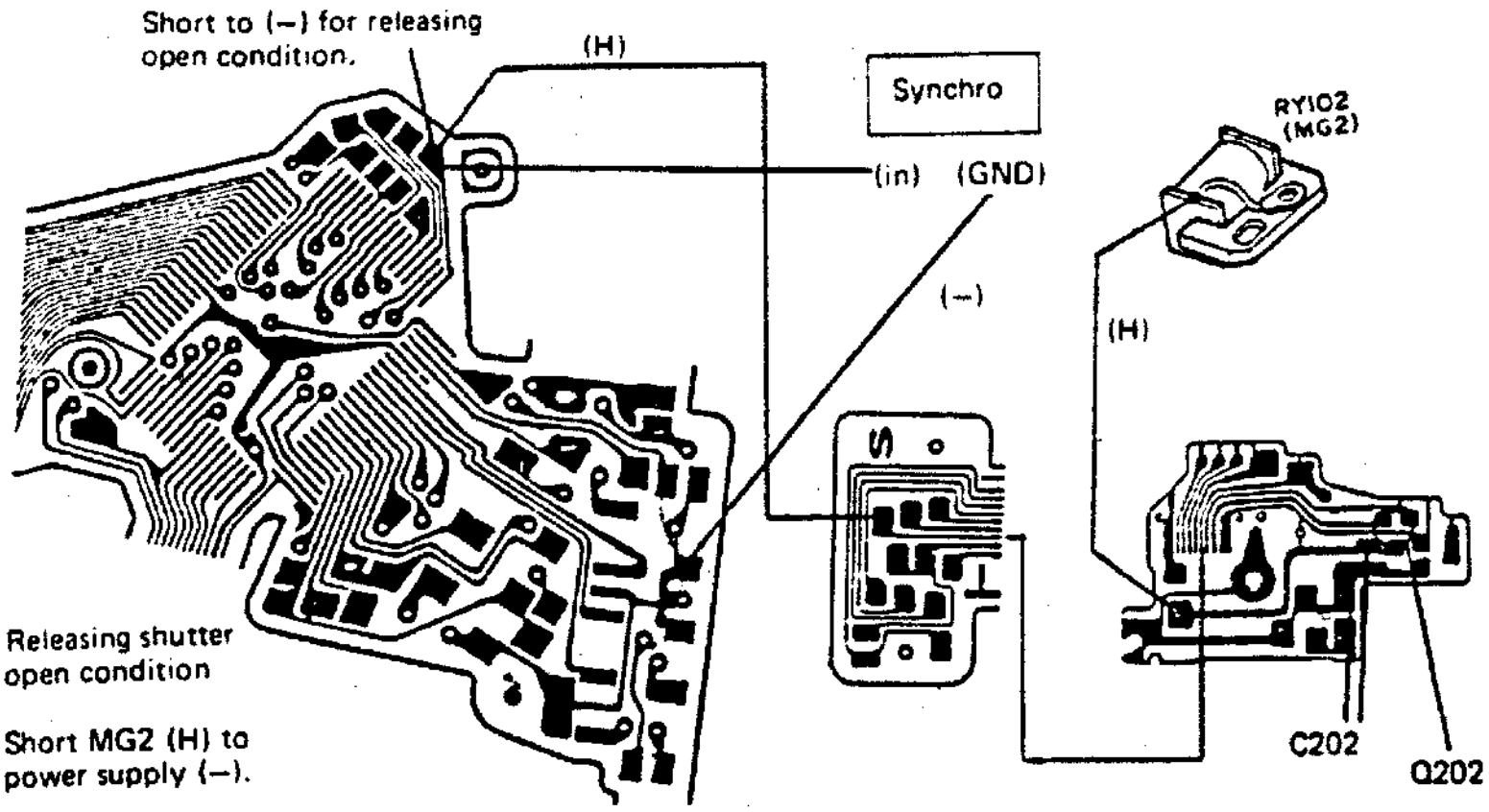
Waveform of Trg signal	Waveform of integral voltage
DC 2V 50ms	DC 2V 0.1S

15. MG2 Drive Circuit: High-Speed Limiter

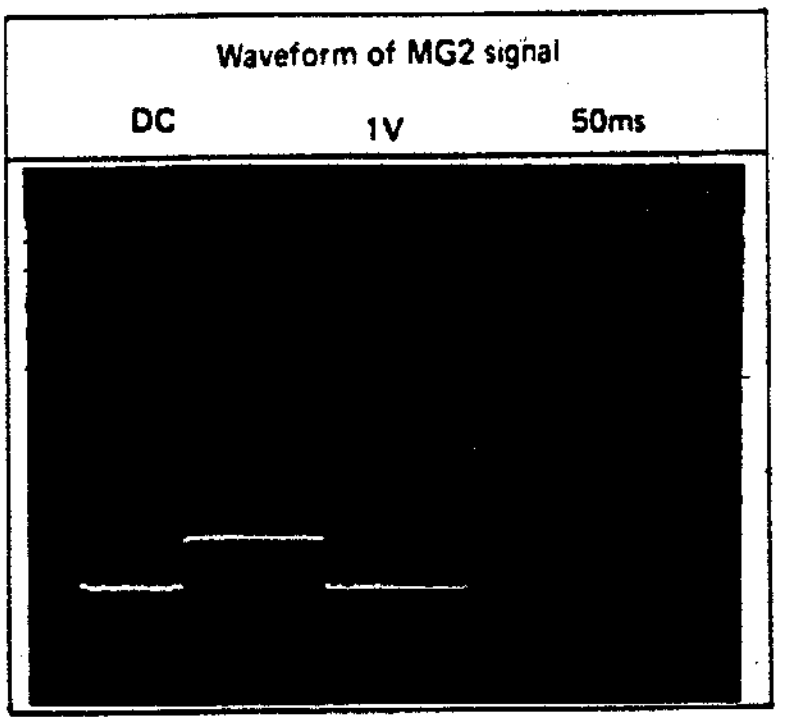
(1) Circuit diagram



(2) Stereoscopic view



- Upon completing integration, the comparator is inverted in the bipolar IC to deenergize MG2.
- MG2 is deenergized by reducing voltage on pin No. 57 of the bipolar IC from 0.6 V to 0 V.
- High-speed limiter
  - When shutter speed is higher than 1/2000 in the AUTO mode, the CPU provides MA and MB (L and H) signals to forcibly deenergize MG2.
  - Malfunction of the high-speed limiter is caused by poor contact between the CPU and bipolar IC (or defect of the IC proper).

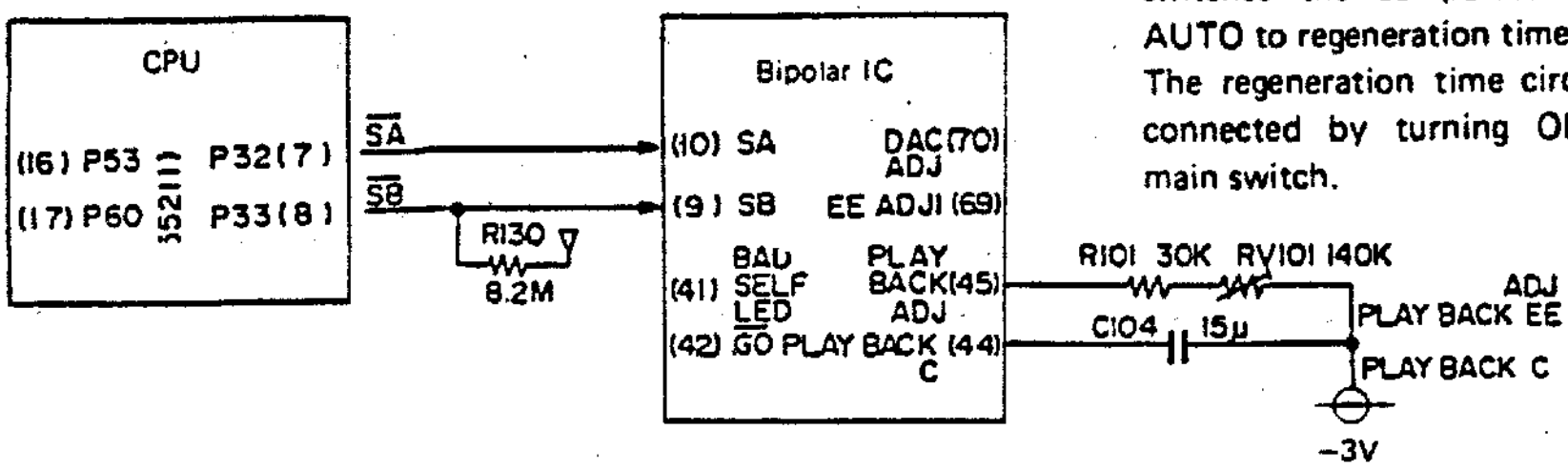


16. Regeneration Time Circuit

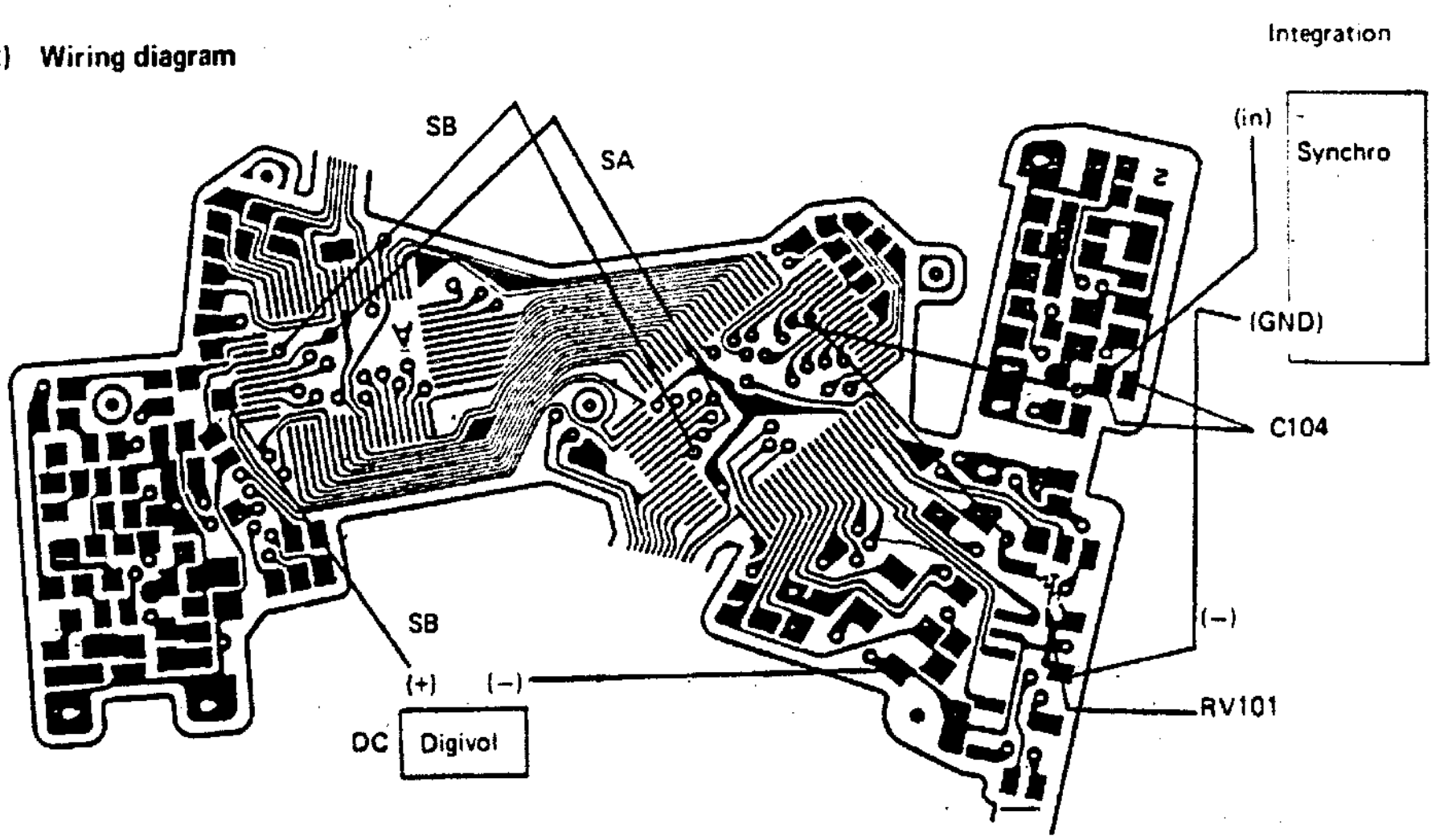
- The regeneration time means MANUAL, SPOT (AUTO or MANUAL) and MEMO time.

(1) Circuit diagram

- The regeneration time circuit switches the comparator from AUTO to regeneration time.
  The regeneration time circuit is connected by turning ON the main switch.

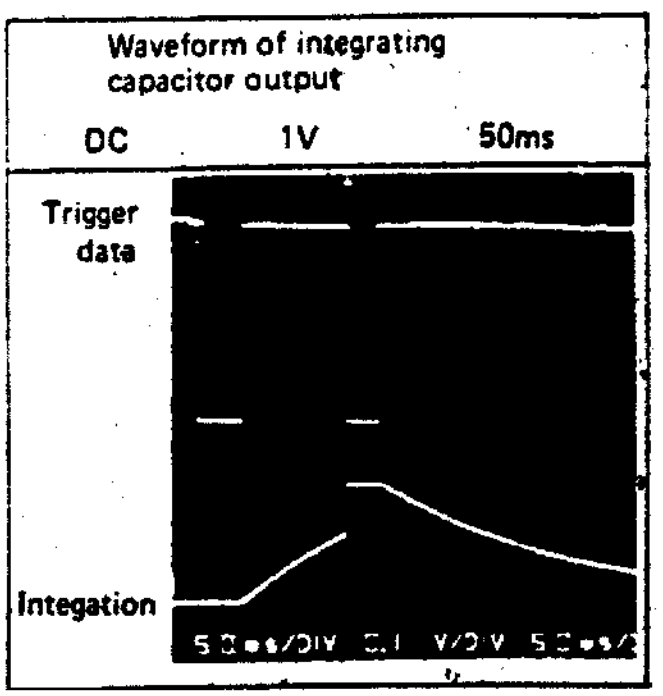


(2) Wiring diagram



- Voltages

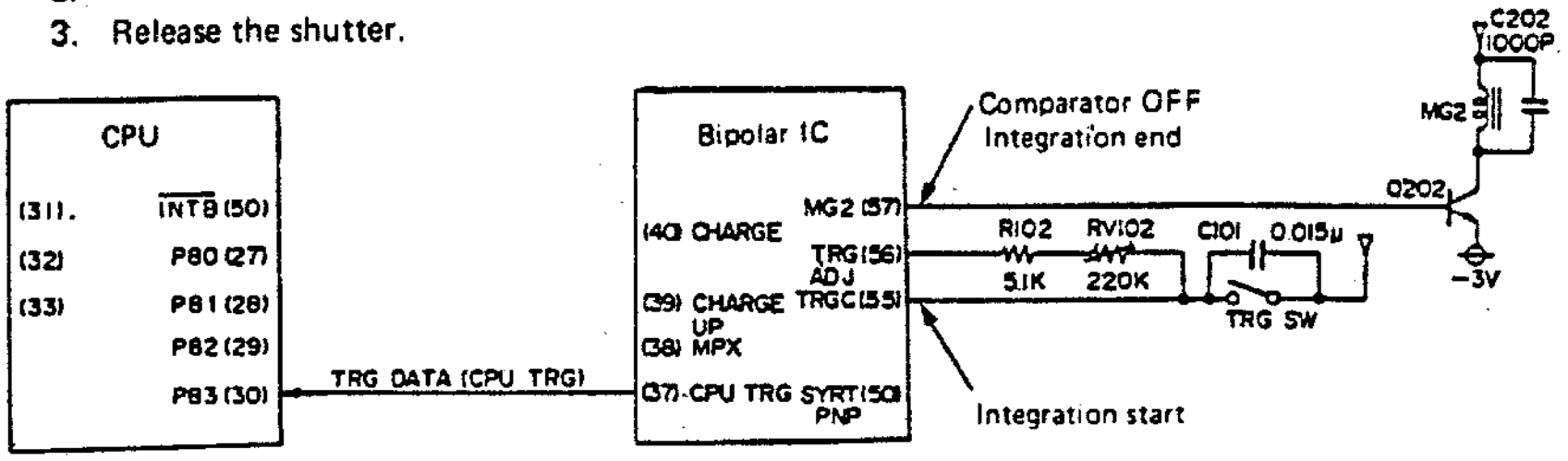
1. For regeneration time
   SA 0.5V, SB 0.5V
   Measure SB on the (−) terminal of R130.
   SA should be checked after removing Araldite from the IC legs.
2. Measure voltage across both ends of RV101.
   DC 0.12 V
3. Integrating capacitor voltage
   - Check voltage waveform with a synchroscope.
   - The comparator is inverted when the voltage reaches 1 V.



17. Trigger Data Latch Circuit

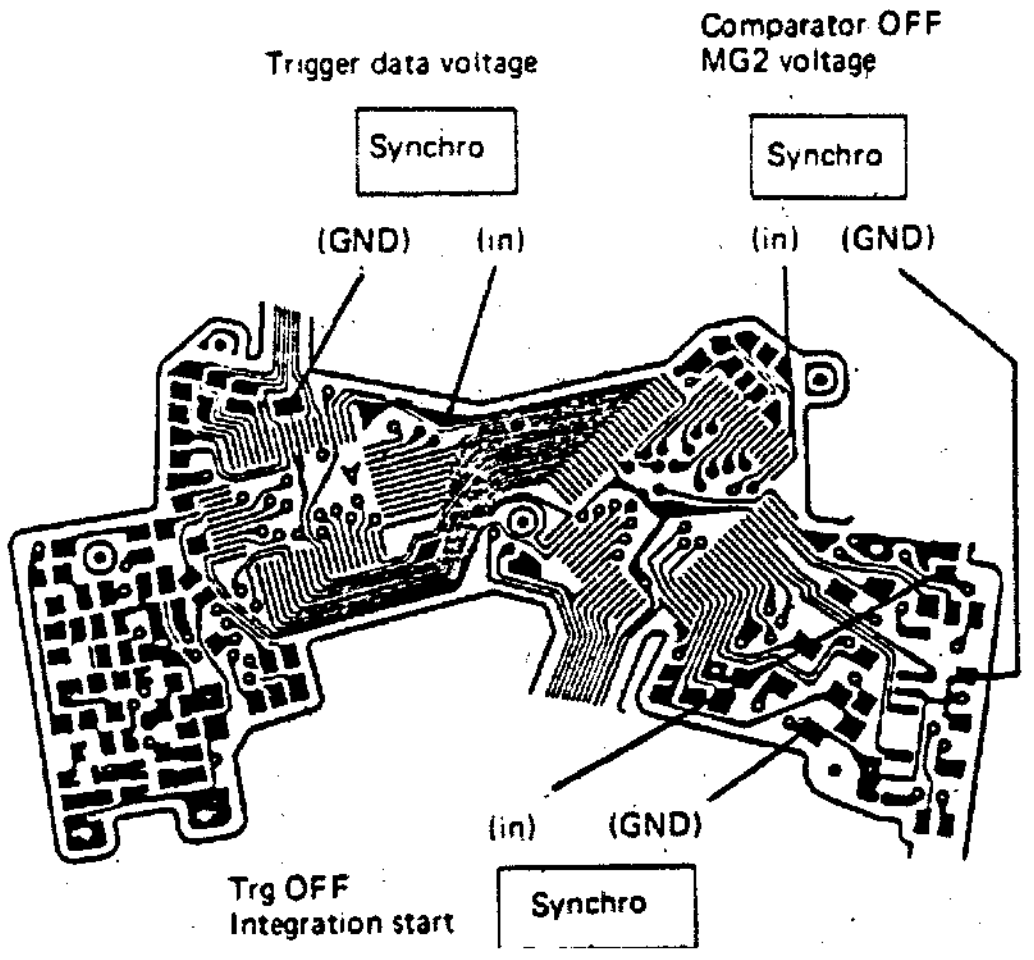
(1) Circuit diagram

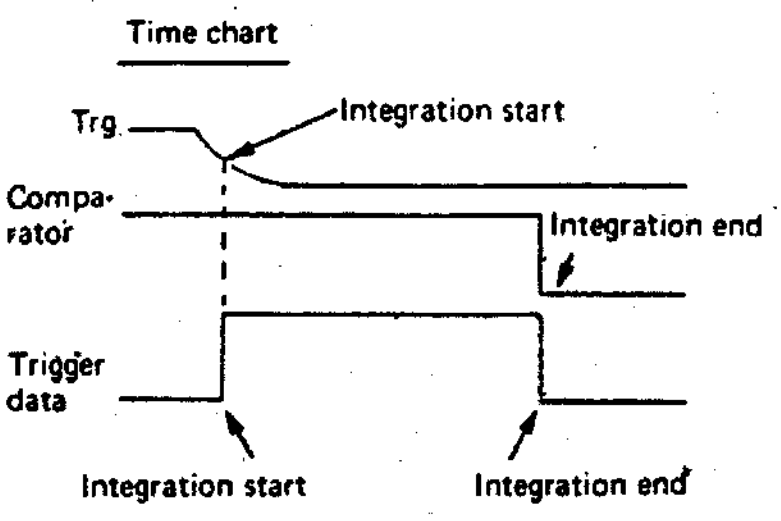
- Checking procedures
  1. Measuring instruments: Digivol
     Synchroscope
  2. Mode: AUTO or MANUAL
  3. Release the shutter.

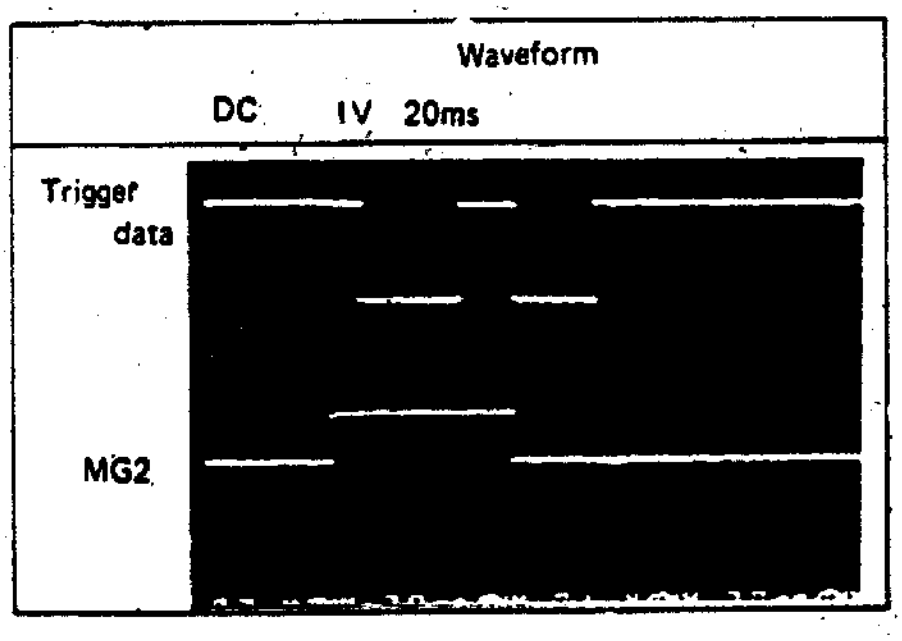


(2) Wiring diagram

- The CPU judges start and end of the integration from the trigger data signals.
  Integration start: Trg OFF
  Integration end: Comparator OFF



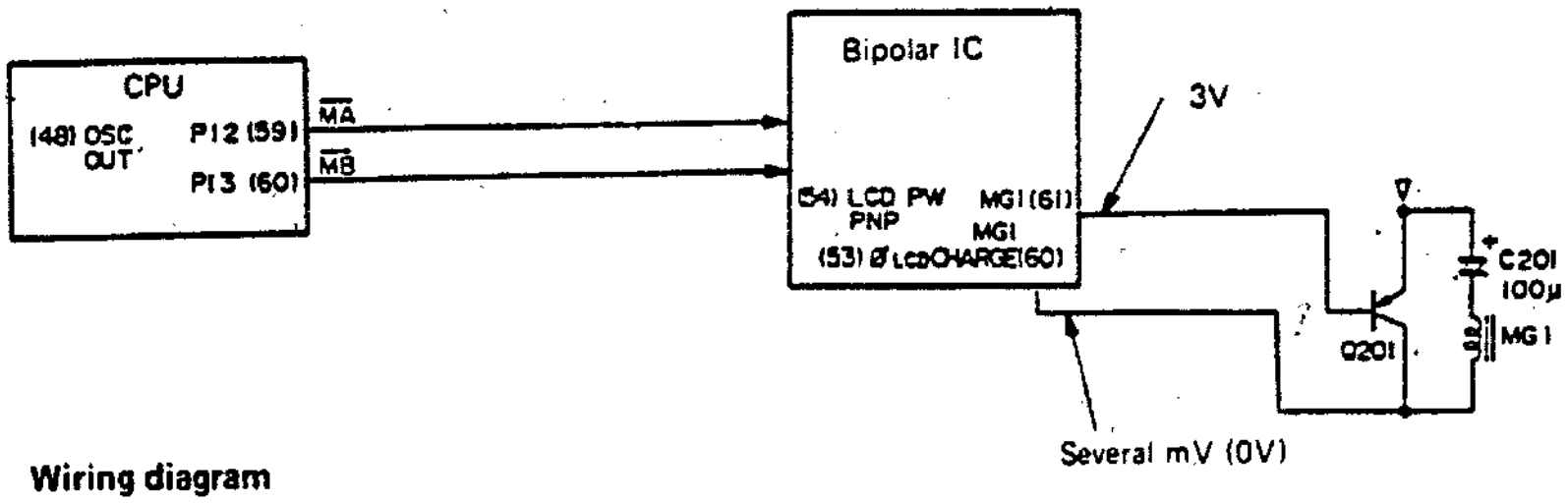




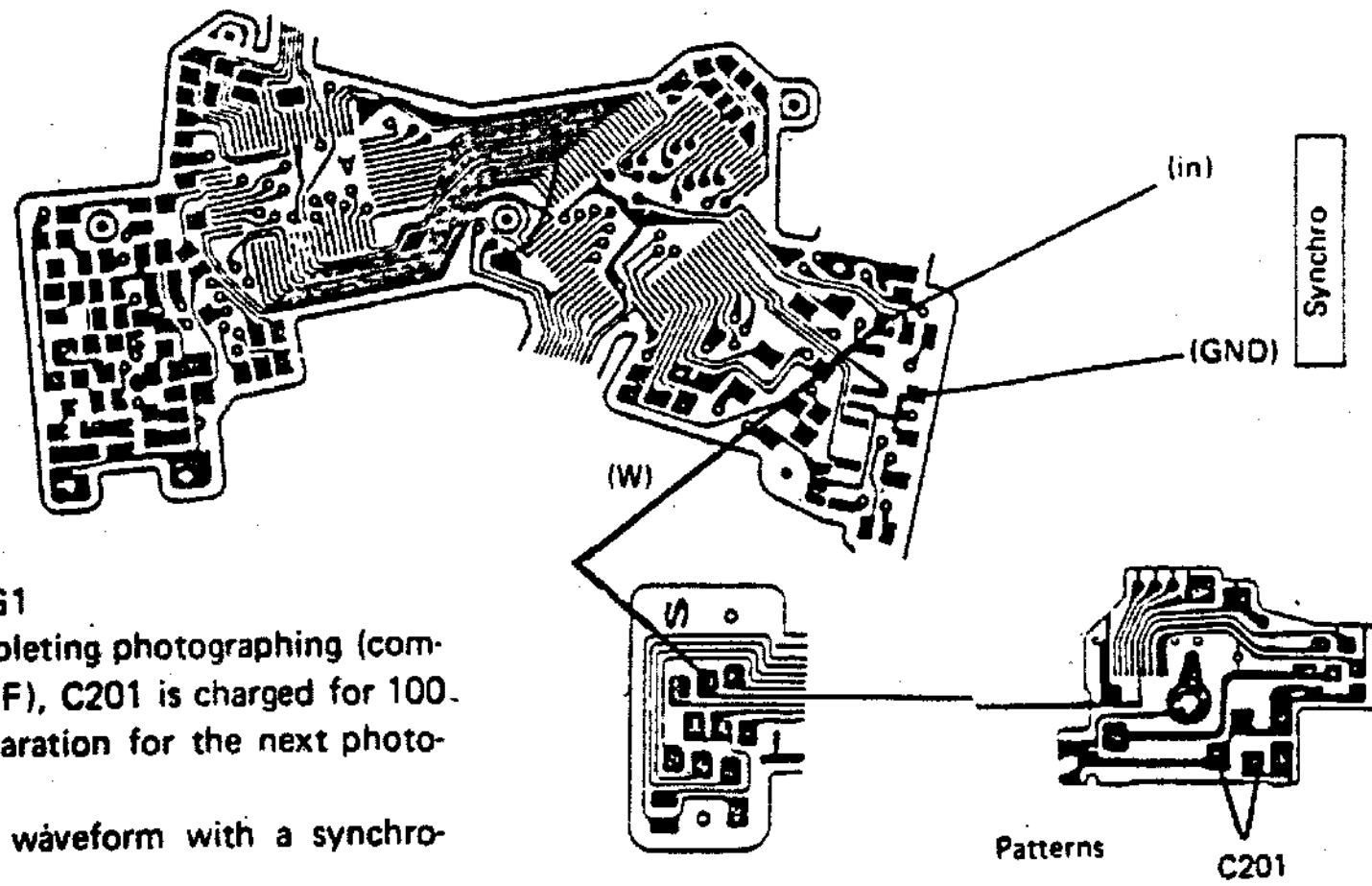
18. MG1 Charging Circuit

(1) Circuit diagram

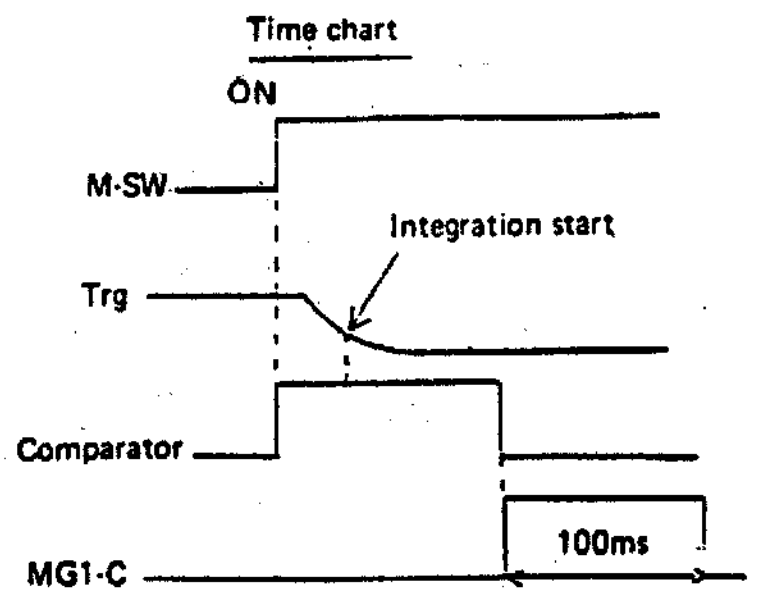
- Checking procedures
  1. Measuring instruments: Digivol or circuit tester
     Shycroscope
  2. Mode: AUTO or MANUAL
     - Release the shutter.

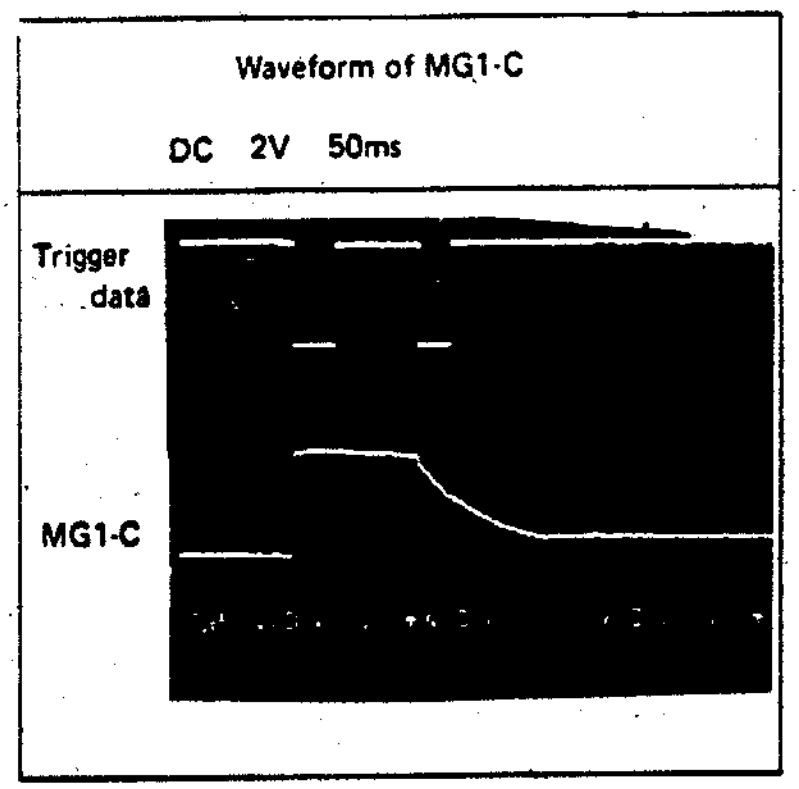


(2) Wiring diagram



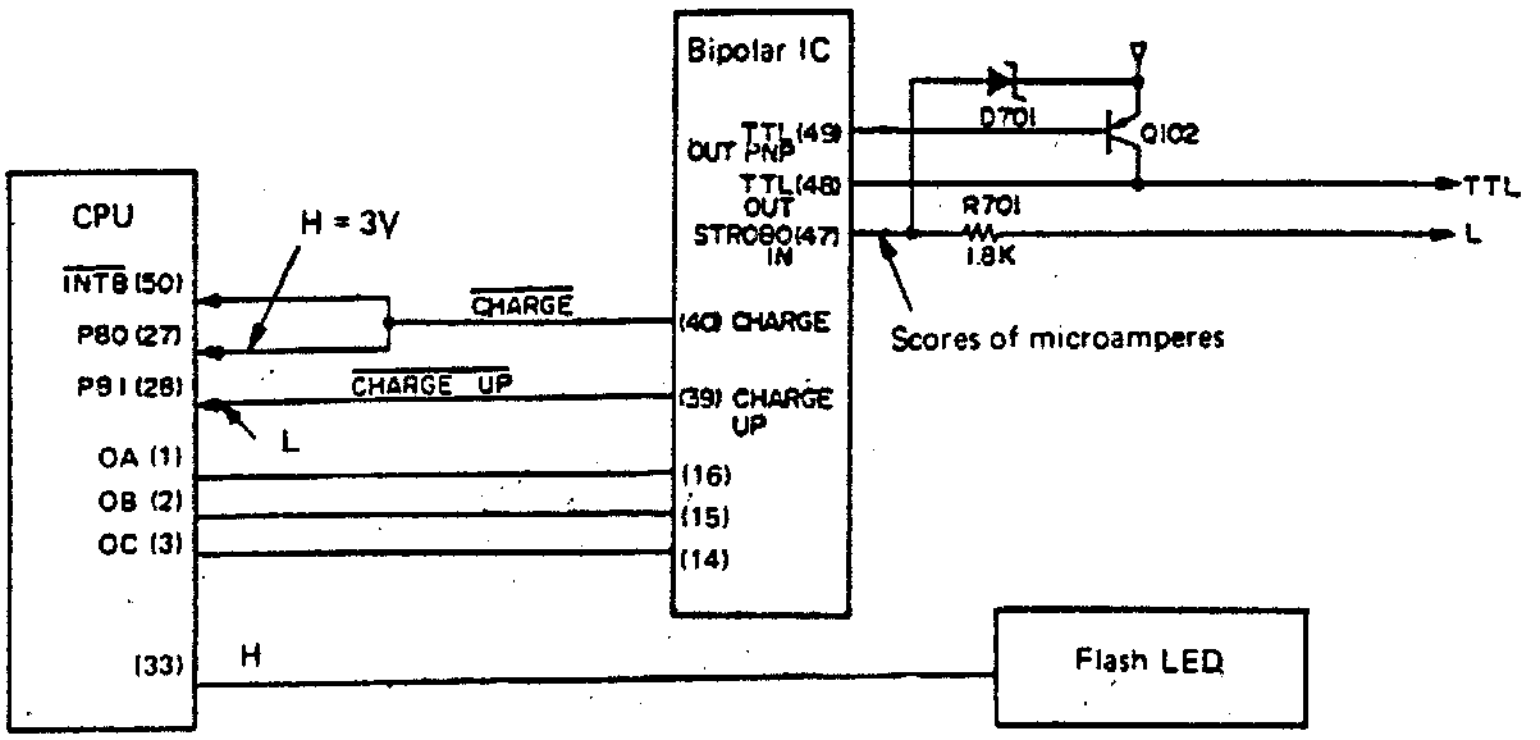
- Charging of MG1
  1. Upon completing photographing (comparator OFF), C201 is charged for 100 ms as preparation for the next photographing.
- Check voltage waveform with a synchroscope.
  1. Release the shutter to allow the mirror to go down.
  2. Then, the charging is started.



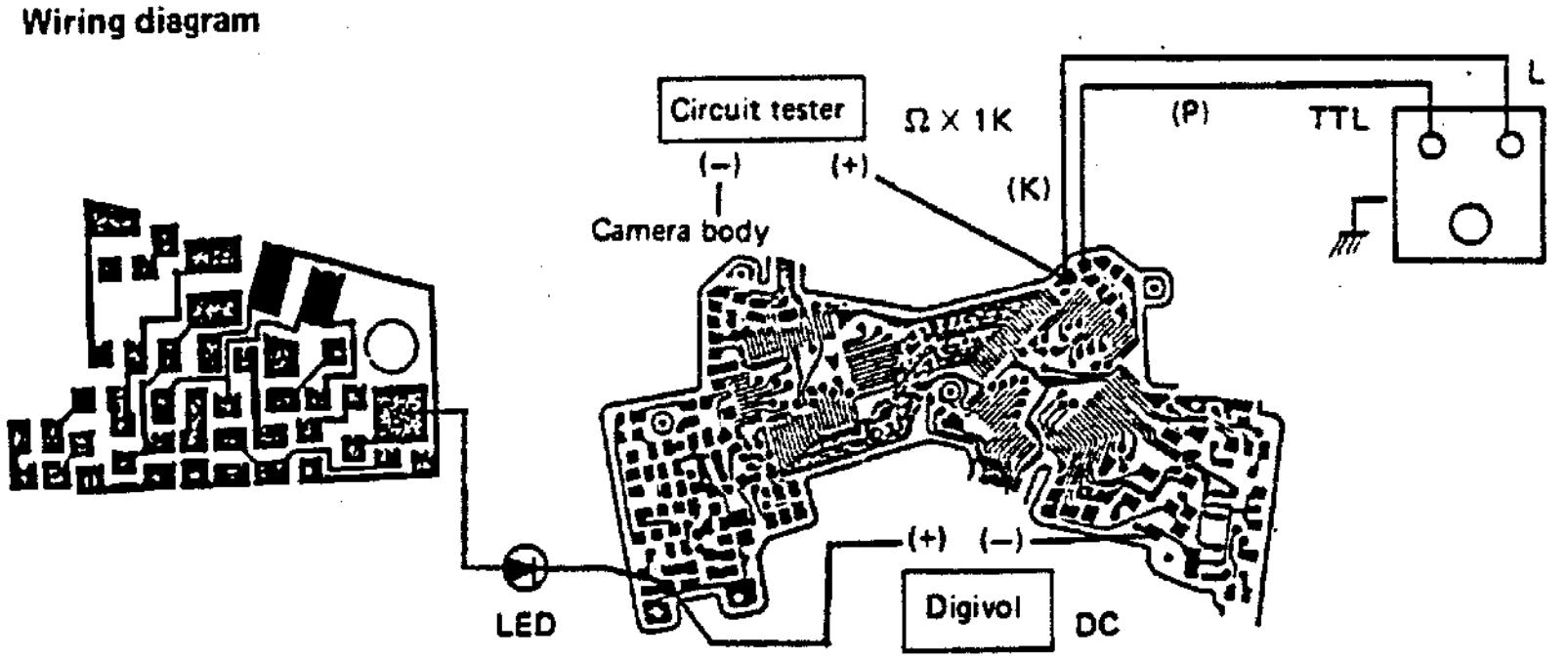


19. Flash Control Circuit

(1) Circuit diagram



(2) Wiring diagram



- Flash control circuit
  1. When the switch is turned ON on the flash, a weak current flows to the L terminal. Then, the bipolar IC sets pin No. 40 at the H level and transmits H signal to the CPU pin No. 27.
  2. Upon receiving the H signal, the CPU sets the camera in the flash mode.
  3. The CPU judges whether or not the shutter speed exceeds 1/60. When the shutter speed is 1/60 or lower, the strobe flash circuit and light control circuits are energized.
     As a result, each circuit of B.P. is energized by OA, OB, OC signal.
  4. Completion of the charging is informed from pin No. 39 of the bipolar IC to pin No. 28 of the CPU.
     The flash LED is lit (H).

- Operation check: Simple method

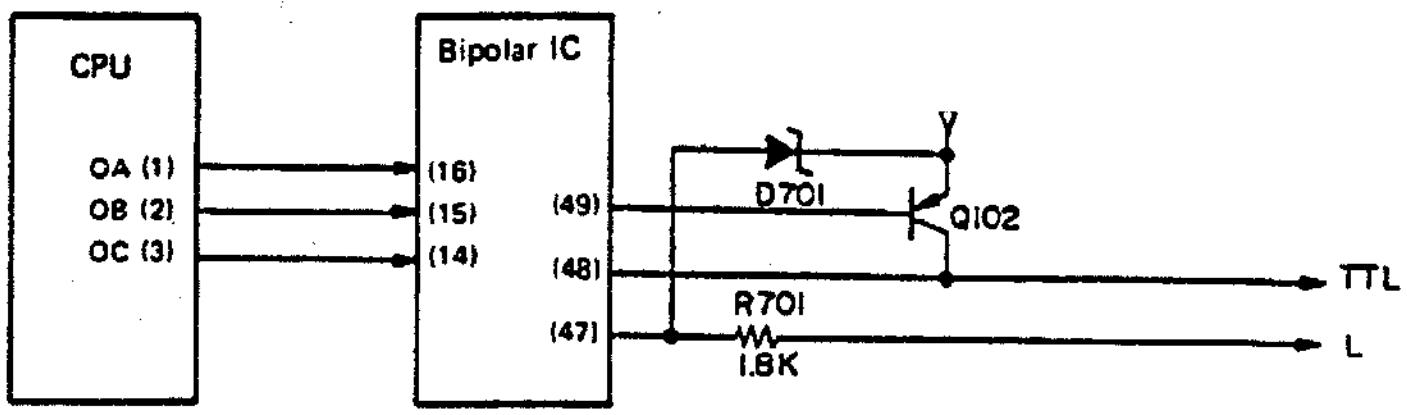
(1) To set the camera in the flash mode.
  - With a circuit tester set at a range of × 1KΩ, connect it between the L terminal and camera body as shown above. (A current of scores of microamperes to 400 microamperes should flow. A certain type of circuit tester allows higher current to flow. In such a case, connect a suitable resistor to limit current within the range specified above.)
  - Select the AUTO mode and attach the body cap to the camera. Release the shutter. When the shutter operates in about 1/60 sec., the camera is normally set in the flash mode.

(2) Charging completion signal provided?
  - Set the circuit tester at the × 100Ω range. The flash LED should normally light.
  - Measure voltage on the LED with a digital voltmeter. It should normally be 3 V.

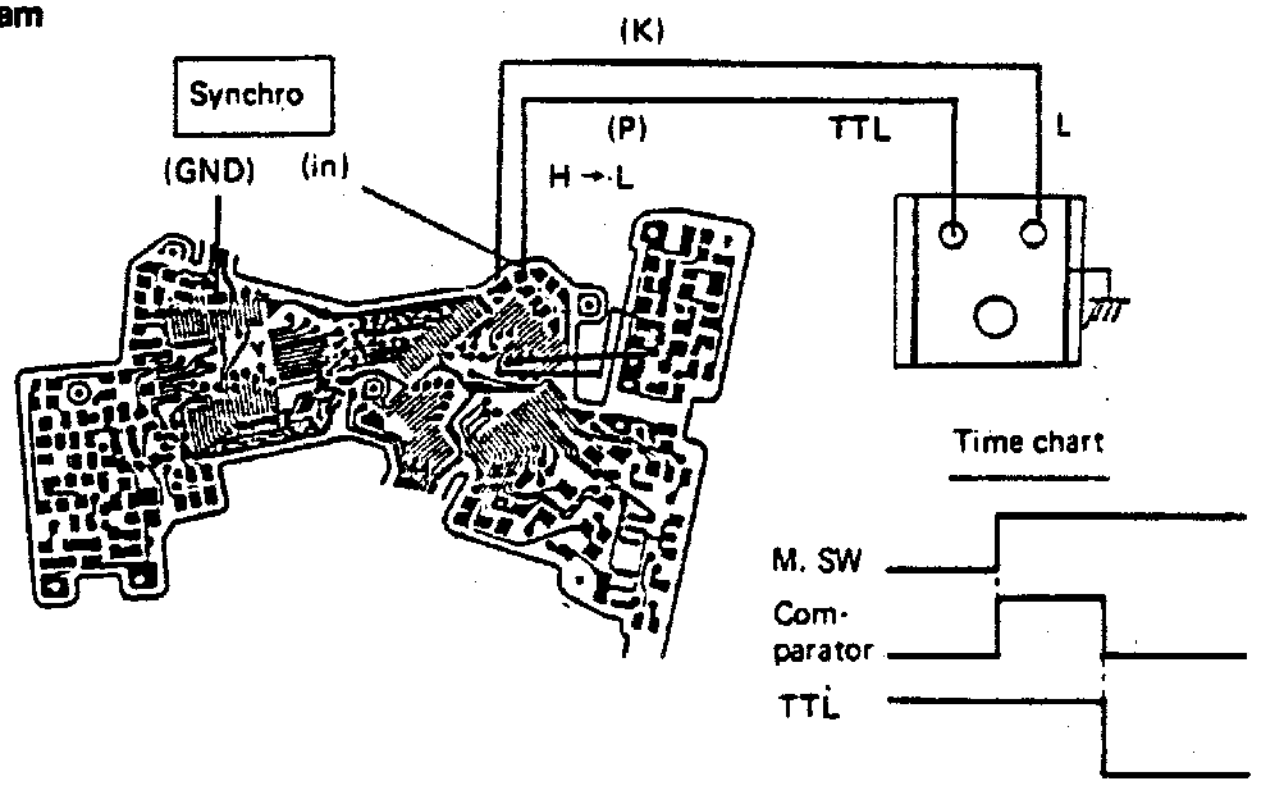
- Current should be flowed for a moment only for lighting the flash LED with a circuit tester.

20. Light Control Circuit

(1) Circuit diagram



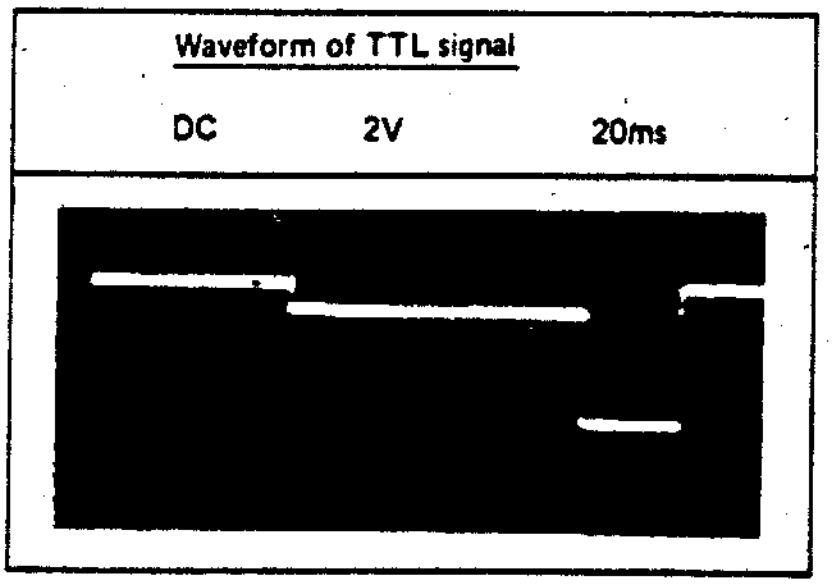
(2) Wiring diagram



- Light control circuit
  1. The CPU provides light control ON signal (OA, OB, OC) when shutter speed is 1/60 or lower, or light control OFF signal when shutter speed exceeds 1/60.
  2. When the light control ON signal is provided, H = 3 V is outputted to TTL and L (2.4 to 2.6 V) is outputted to pin No. 49.
     (The light control is not stopped by other stop signals.)
  3. When the strobe flashes (see flashing circuit) and exposure time is optimum, the comparator is inverted to deenergize MG2.
     Simultaneously, the circuit set pin No. 48 and pin No. 49 at the L and H levels respectively to stop flashing of the strobe.

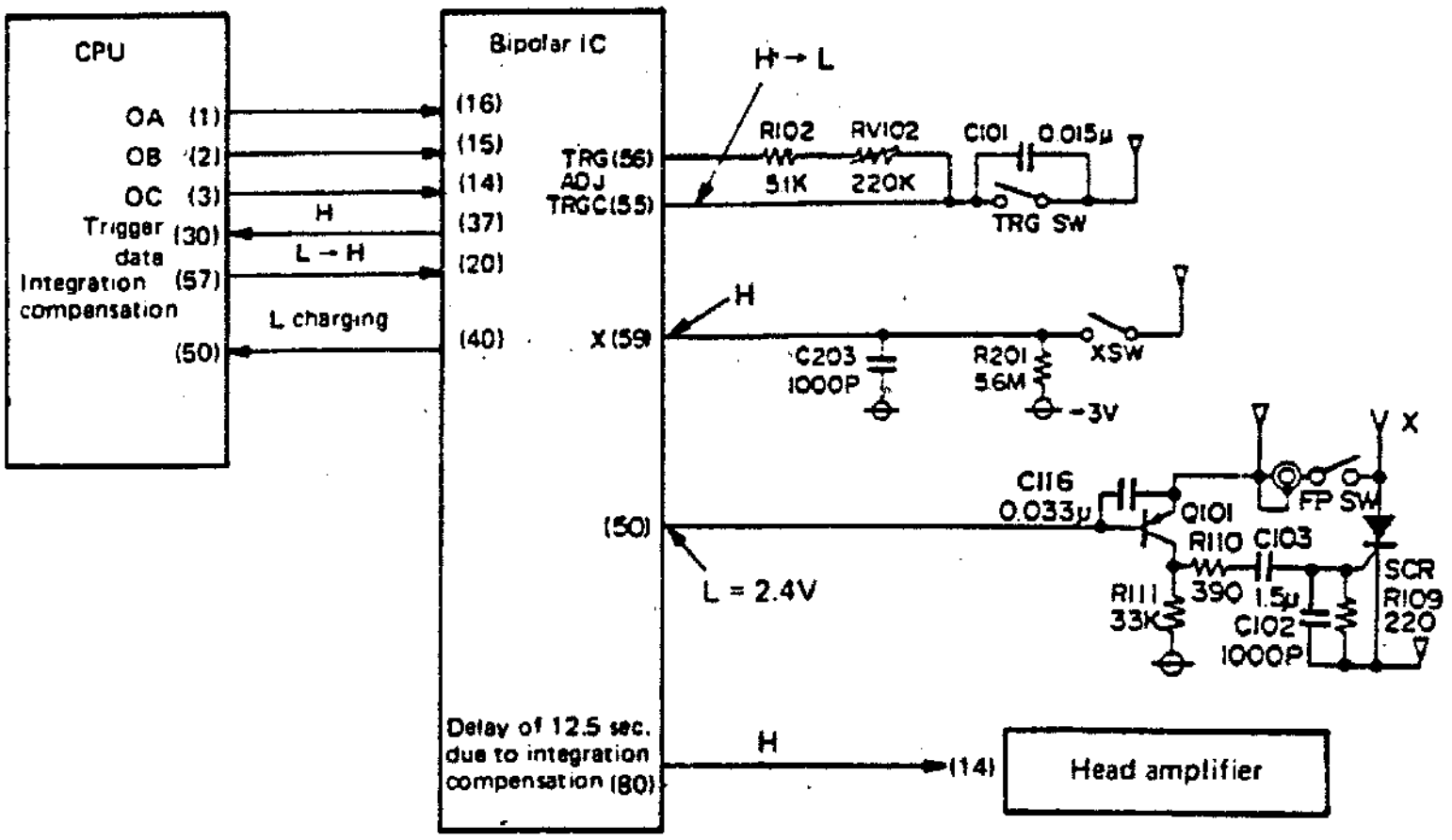
- Checking procedures

- TTL signal
  - Set the camera in the AUTO mode and attach the strobe in position.
  - Connect lead wires (P) and (K) as well as the shielded wire correctly from the top cover. Set the strobe ready for use.
  - Connect the lead wires without assembling the top cover with the camera body.
  - Connect the strobe to the top cover and allow it to flash.
  - At this time, form the strobe flashing circuit as shown above.



21. Flashing Circuit

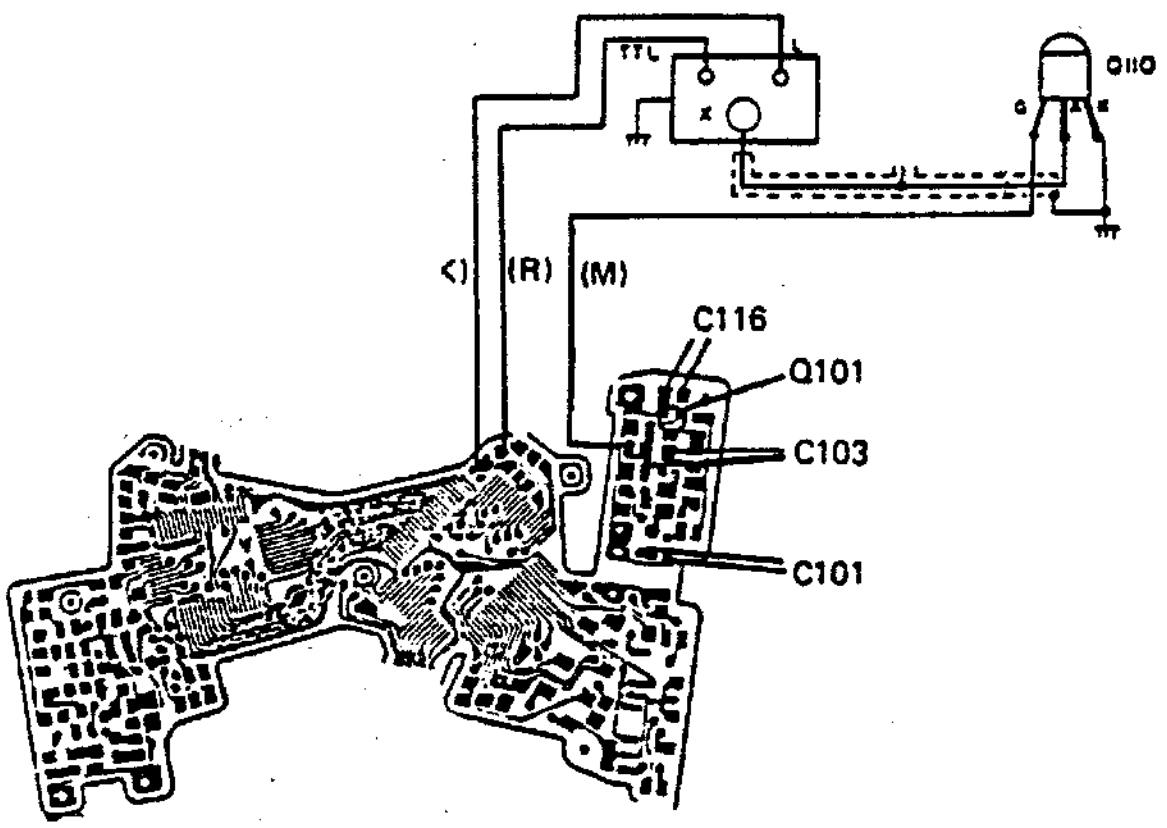
(1) Circuit diagram



(2) Wiring diagram

• .Flashing circuit

1. By releasing the shutter:
   - .M SW ON
   - MG1 ON
   - Trg OFF
2. The Trig OFF is used as trigger data signal H inputted from B.P. pin No. 37 to CPU pin No. 30.
3. Upon receiving the trigger data signal, the CPU outputs integrator compensation signal L to delay Trg 12.5 ms.
4. When X SW is turned ON, pin No. 59 and pin No. 50 are set at the H and L (2.4V) levels respectively to turn ON the thyristor for flashing.
5. Upon flashing, the integrator compensation signal is set at the H level and integration start is informed from B.P. pin No. 80 to the head amplifier.
6. Upon flashing, L terminal current is stopped and B.P. pin No. 40 is set at the L level to inform the flashing to CPU pin No. 50.

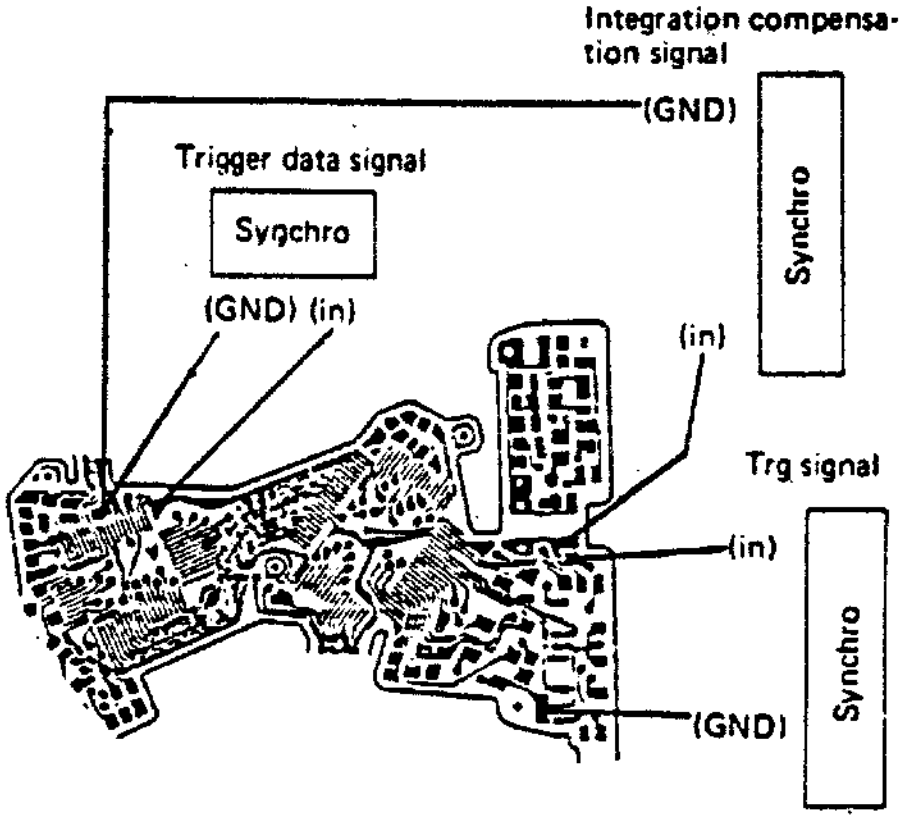


7. Upon receiving the flashing signal, the CPU actuates the OVER/UNDER exposure circuit at the next stage.
8. Upon completing the integration, the comparator is inverted and the light control circuit at the preceding stage operates to stop the flashing.

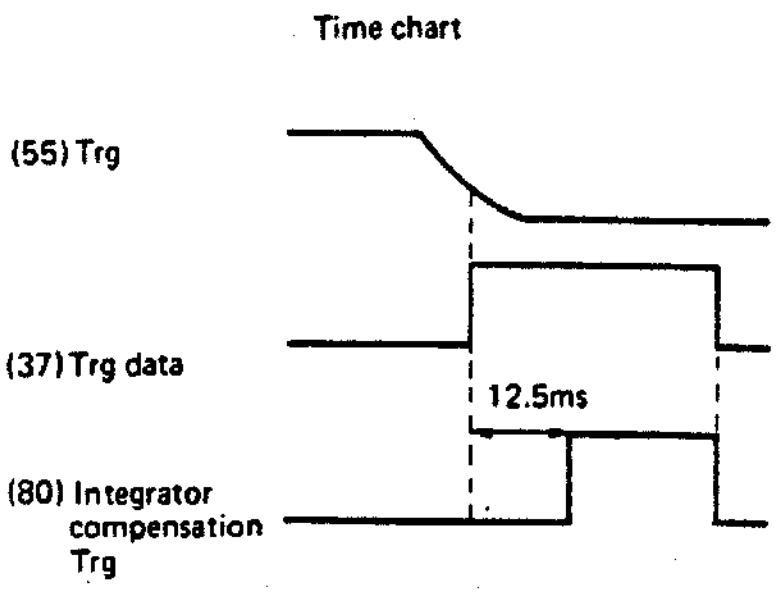
- Flashing circuit voltage

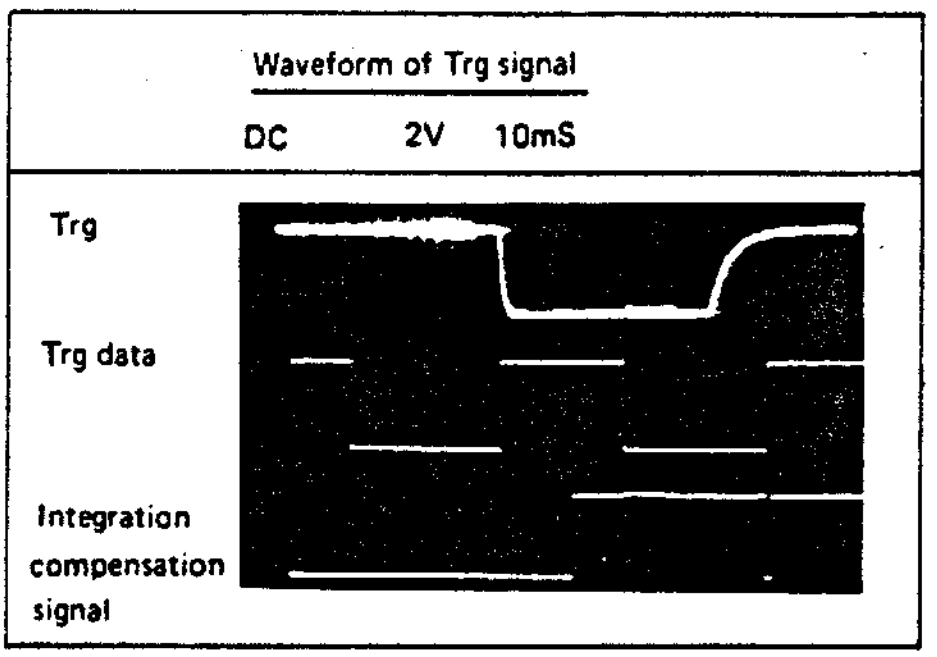
Check procedures

1. After detaching the top cover, connect the lead wires necessary for flashing the strobe.
   (1) Pink lead wire
   (2) Light green lead wire
   (3) Shielded wire
2. Attach the strobe to the top cover.
3. Bring the measuring terminals of a synchroscope into contact with the measuring point.
4. Flash the strobe by releasing the shutter.
5. At this time, measure voltage with the synchroscope.

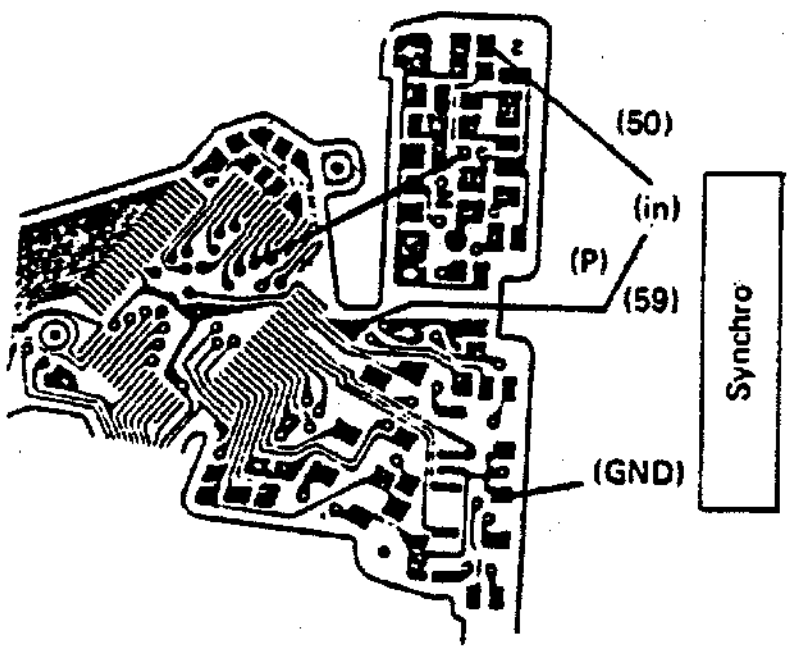


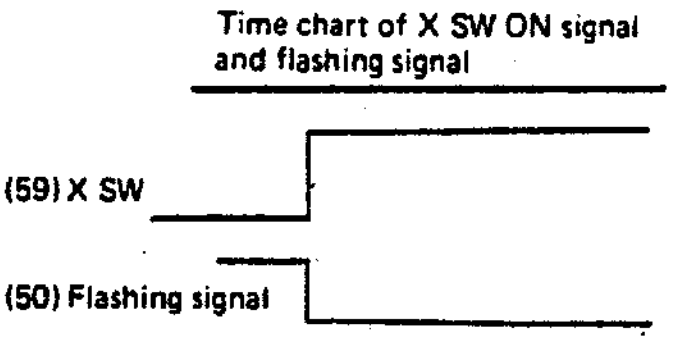
1. Each Trg signal provided?

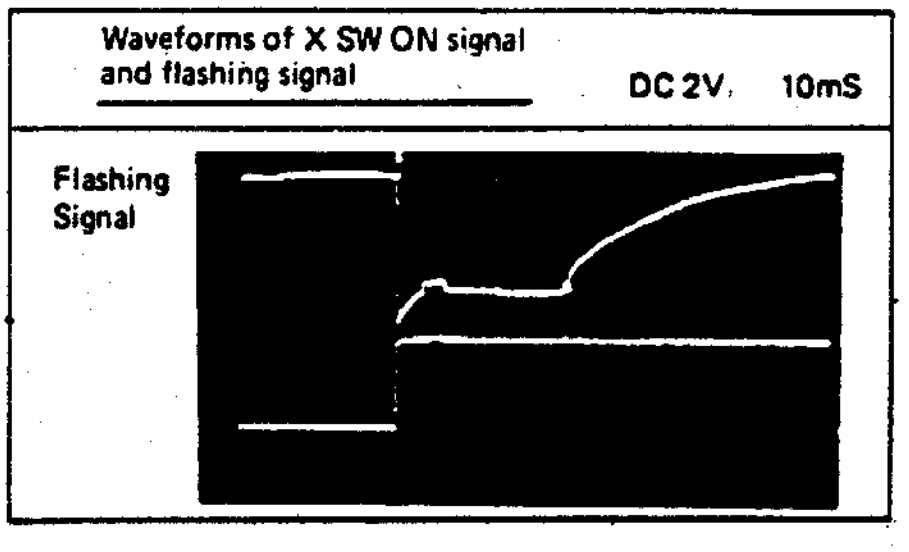




2. X SW ON signal and flashing signal (50) provided?

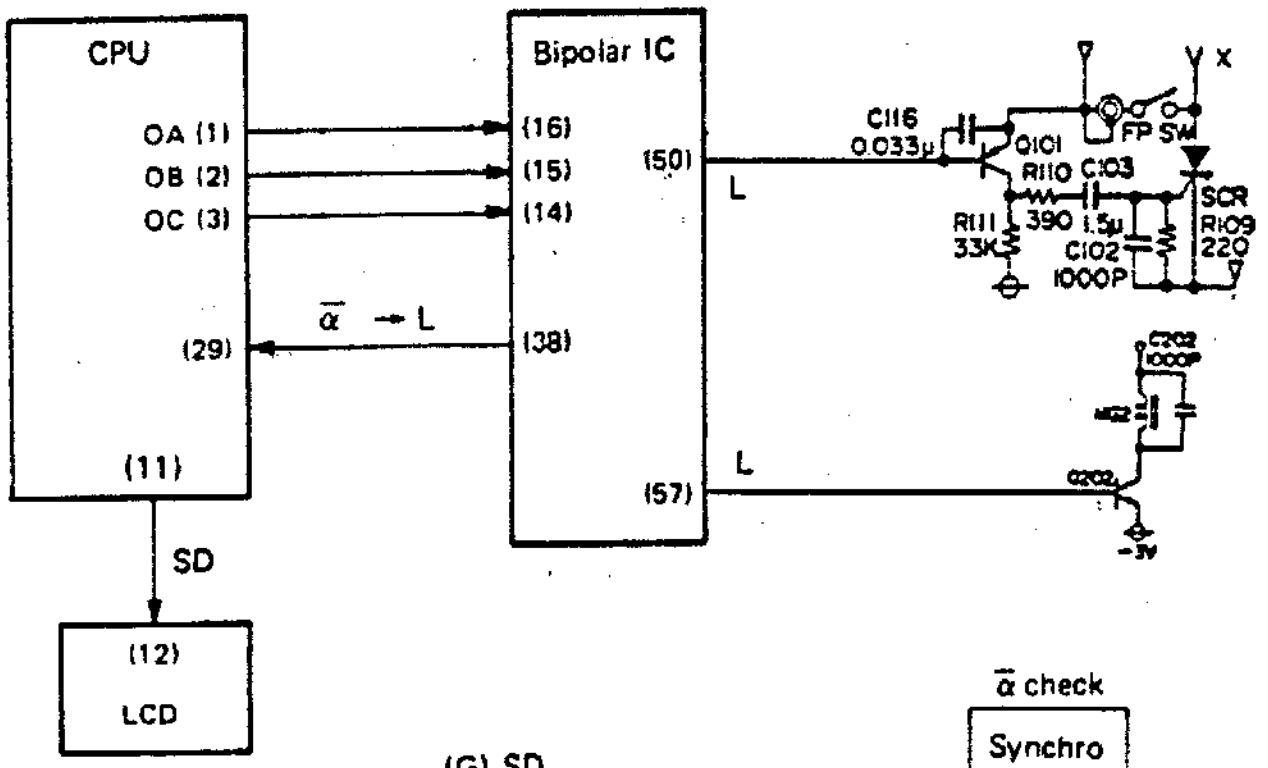




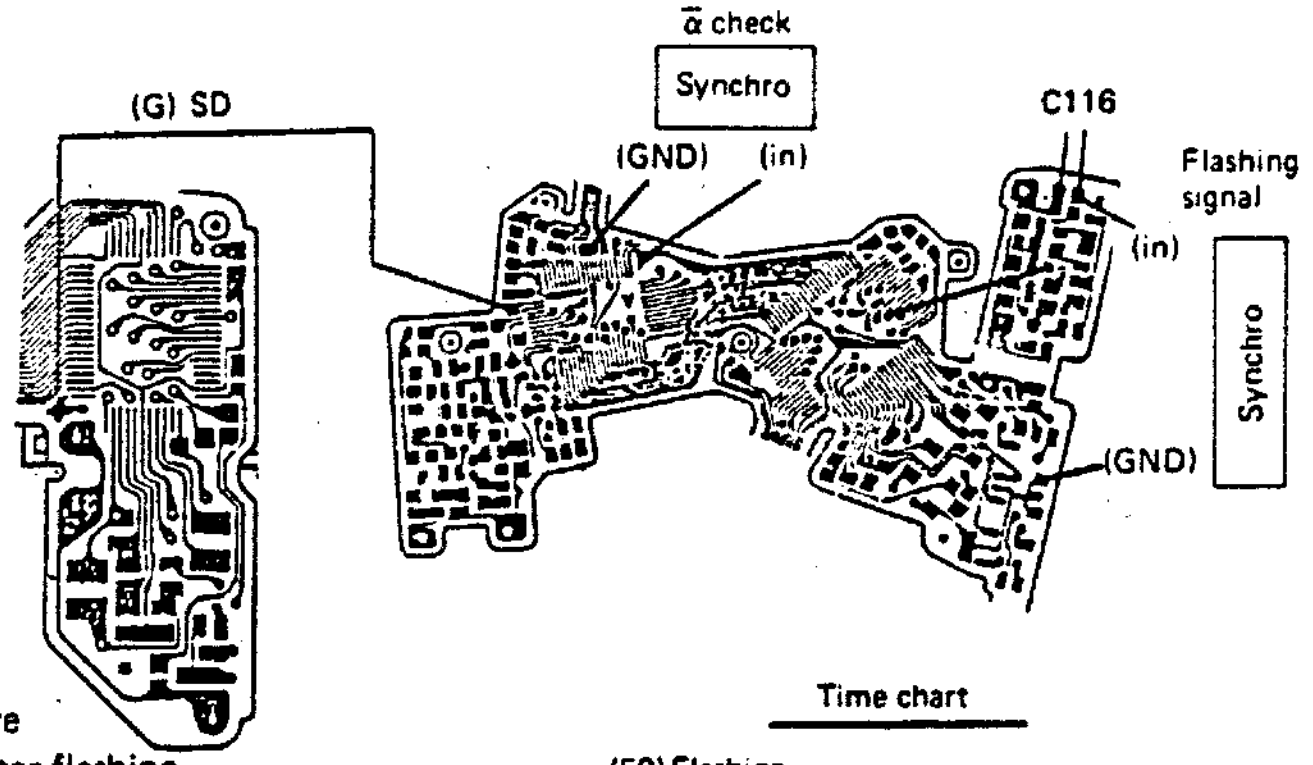


22. Over/Under Exposure Circuit

(1) Circuit diagram

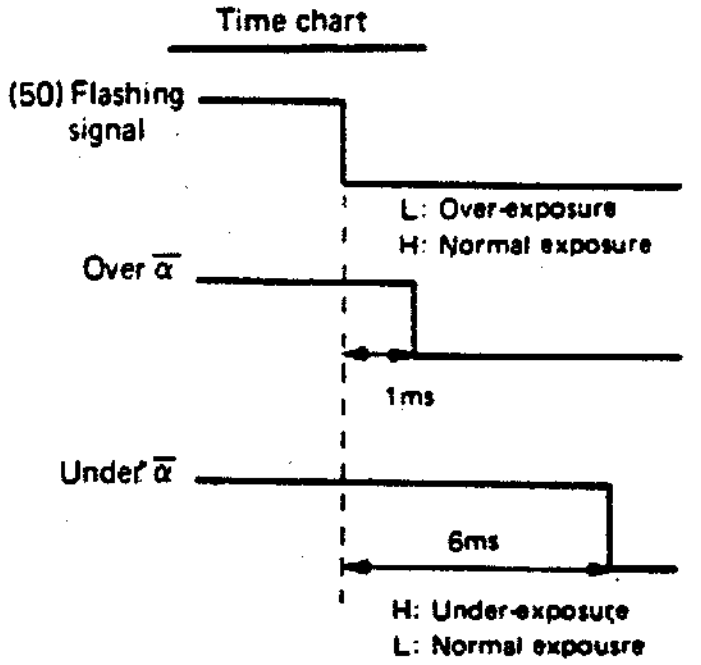


(2) Wiring diagram



- Over/under exposure circuit

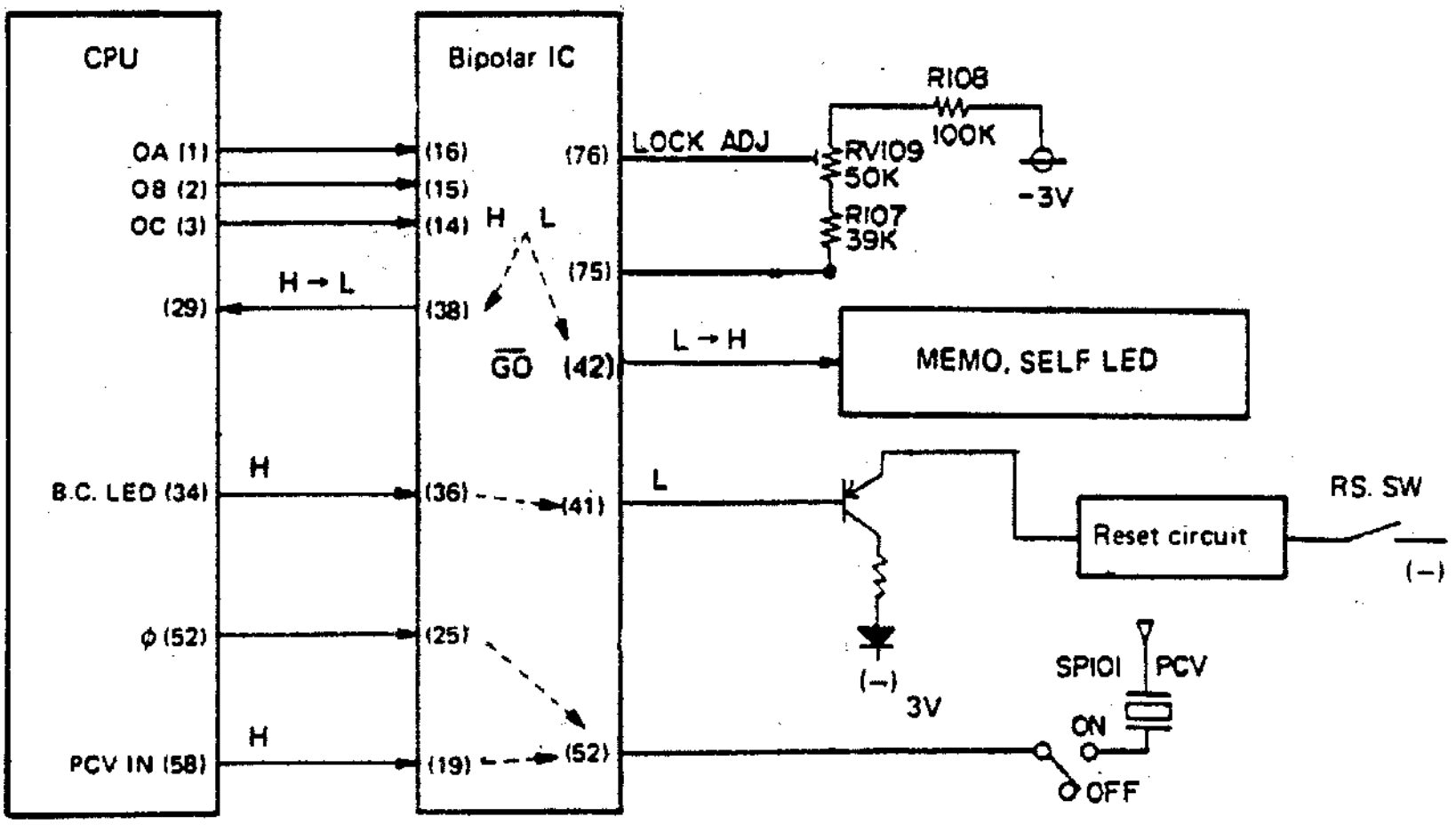
1. Check for over-exposure
   - Check voltage 1ms after flashing.
   - The OVER indication should light if the exposure is +1 EV or more higher than the correct level.
2. Check for under-exposure
   - Check voltage 6 ms after flashing.
   - The UNDER indication should light if the exposure is −0.6EV or more lower than the correct level.
3. Operations of CPU
   1. Outputs OA, OB and OC signals to check for over/ under exposure.
   2. Check result is informed by L signal from pin No. 38 of the bipolar IC to pin No. 29 of the CRU.
   3. The CPU indicates the result on the LCD.



- The over/under exposure circuit has no external circuit. Trouble in the over/under exposure circuit is traced to defect in the IC or indication circuit.

23. B.C. Circuit

(1) Circuit diagram



(2) Stereoscopic view

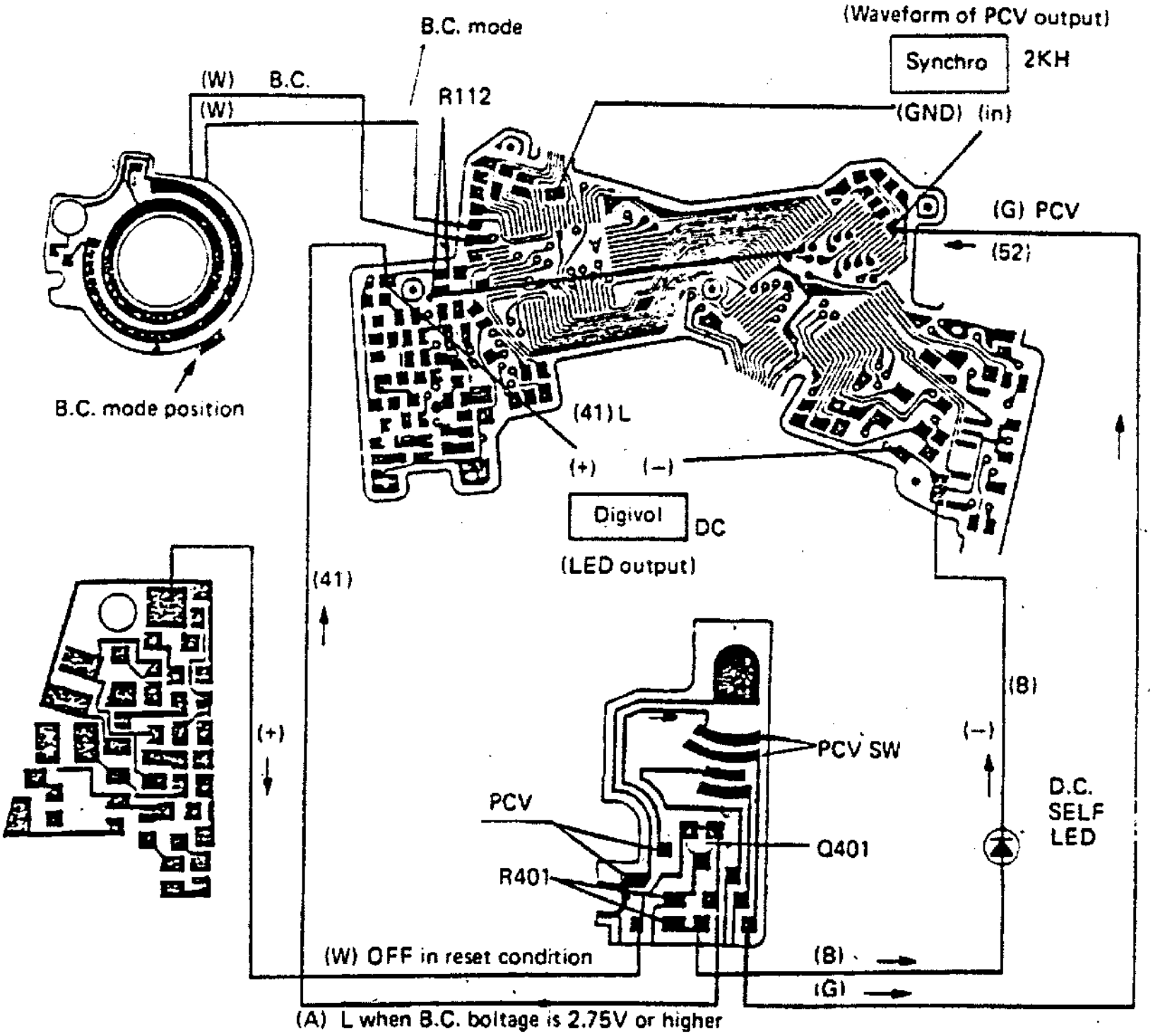
- B.C. circuit

1. When the camera is set in the B.C. mode, the CPU outputs OA, OB and OC signals for battery check.
2. When voltage is lower than the lock voltage of 2.65 V, all the circuits other than the CPU are deenergized. Further, H signal is outputted from pin No. 42 of B.P. to extinguish the MEMO and SELF LESs.
3. When power supply voltage exceeds 2.75 V, pin No. 38 of B.P. is set at the L level to emit L signal to pin No. 29 of the CPU.
4. When pin No. 29 is set at the L level, the CPU sets pin No. 34 at the H level to emit H signal to pin No. 36 of B.P.
   When pin No. 36 is set at the H level, pin No. 41 is set at the L level to light the B.C. LED.
5. Simultaneously, the CPU sets pin No. 58 at the H level. The H signal is transmitted to pin No. 19 of B.P. to turn ON pin No. 52 of B.P.
6. When pin No. 52 is set at ON, φ signal from the CPU is processed by B.P. and outputted from pin No. 52 to sound the PCV.
7. When the voltage exceeds the lock voltage and lower than 2.75 V, the CPU turns ON and OFF pin No. 34 and No. 58 to flicker the LED and sound the PCV intermittently.

- Adjustment of B.C. voltage (lock voltage)

1. The B.C. voltage can be adjusted in the procedure similar to that for adjusting Vref = 1.8 mV.
2. Turn RV109 until pin No. 75 of BP is set at 18 V ± 50 mV.

(2) Wiring diagram



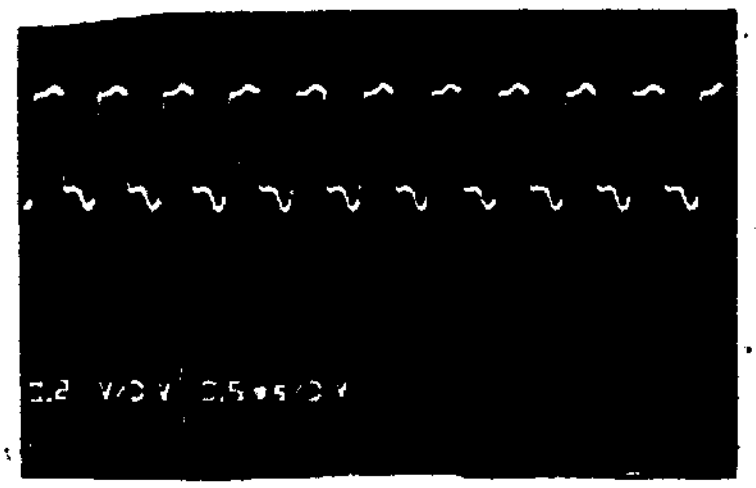
- Voltage checks

  (1) PCV output
  Check waveform with a synchroscope.

  (2) LED output
  Check the LED output to confirm that it is at the L level on pin No. 41 of B.P.

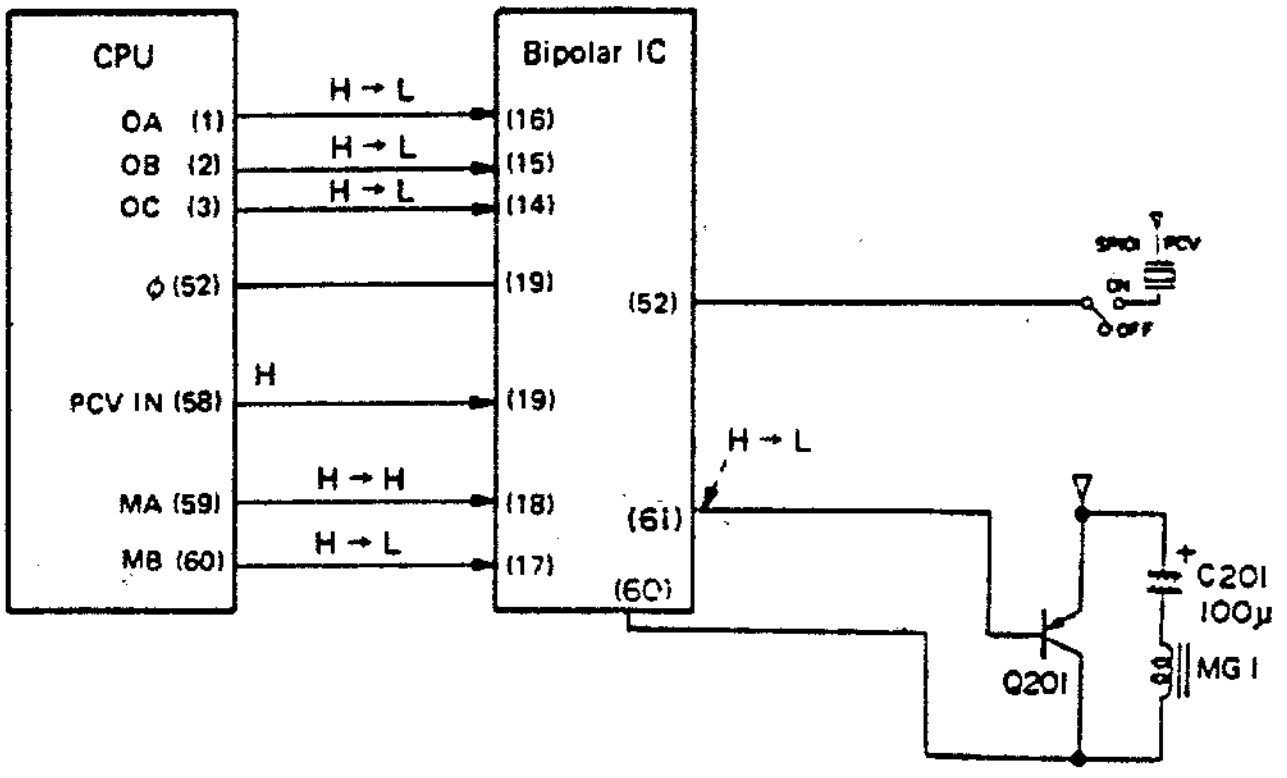
Waveform of PCV output

DC 2V 0.5ms



24. Self-Timer Circuit

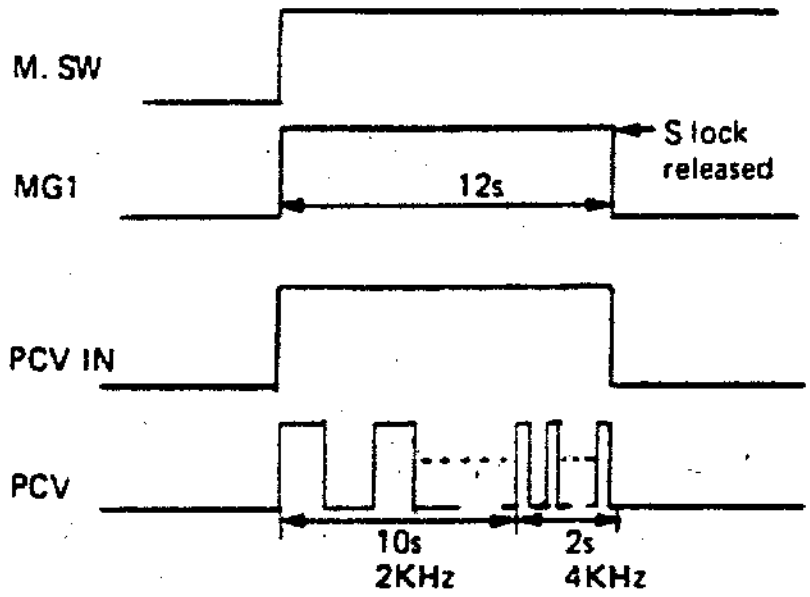
(1) Circuit diagram



- Self-timer circuit

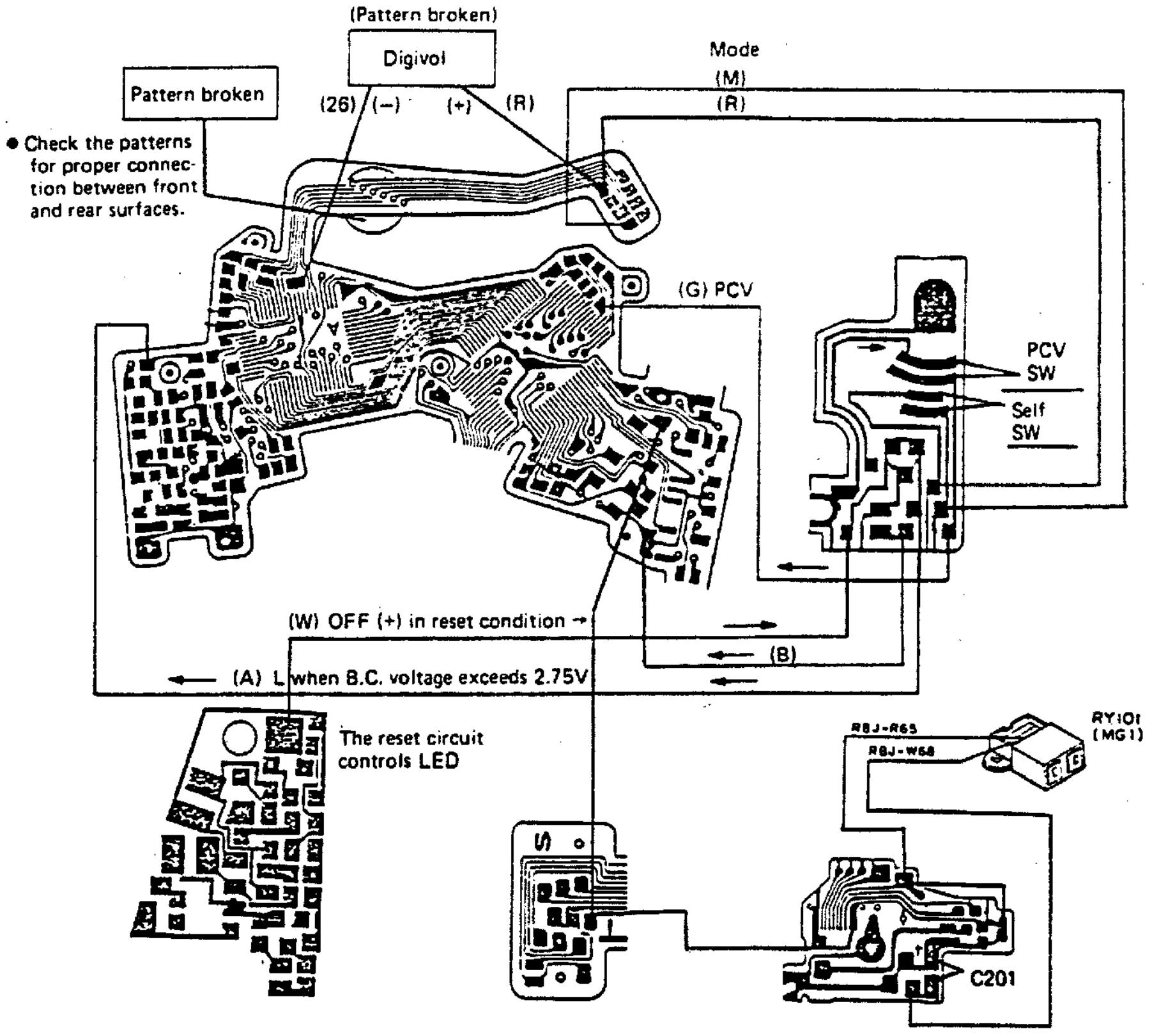
1. When the camera is set in the SELF mode, the CPU delays MG1 ON time by MA and MB signals 12 seconds. Therefore, the shutter is locked for 12 seconds.
2. For the 12 seconds, the CPU outputs H signal from pin No. 58 to set pin No. 52 of B.P. at ON.
3. The ϕ signal from pin No. 52 of the CPU is inputted to pin No. 19 of B.P. and reduced to 2 kHz by B.P. Then, the signal is outputted from pin No. 52 to sound the PCV.
4. 10 seconds later, the CPU provides OA, OB OC signals to set the output from pin No. 52 at 4 kHz for the rest 2 seconds.
5. 12 seconds later, the CPU provides MA and MB signals to release the shutter lock condition by energizing MG1.

Time chart



(2) Wiring diagram

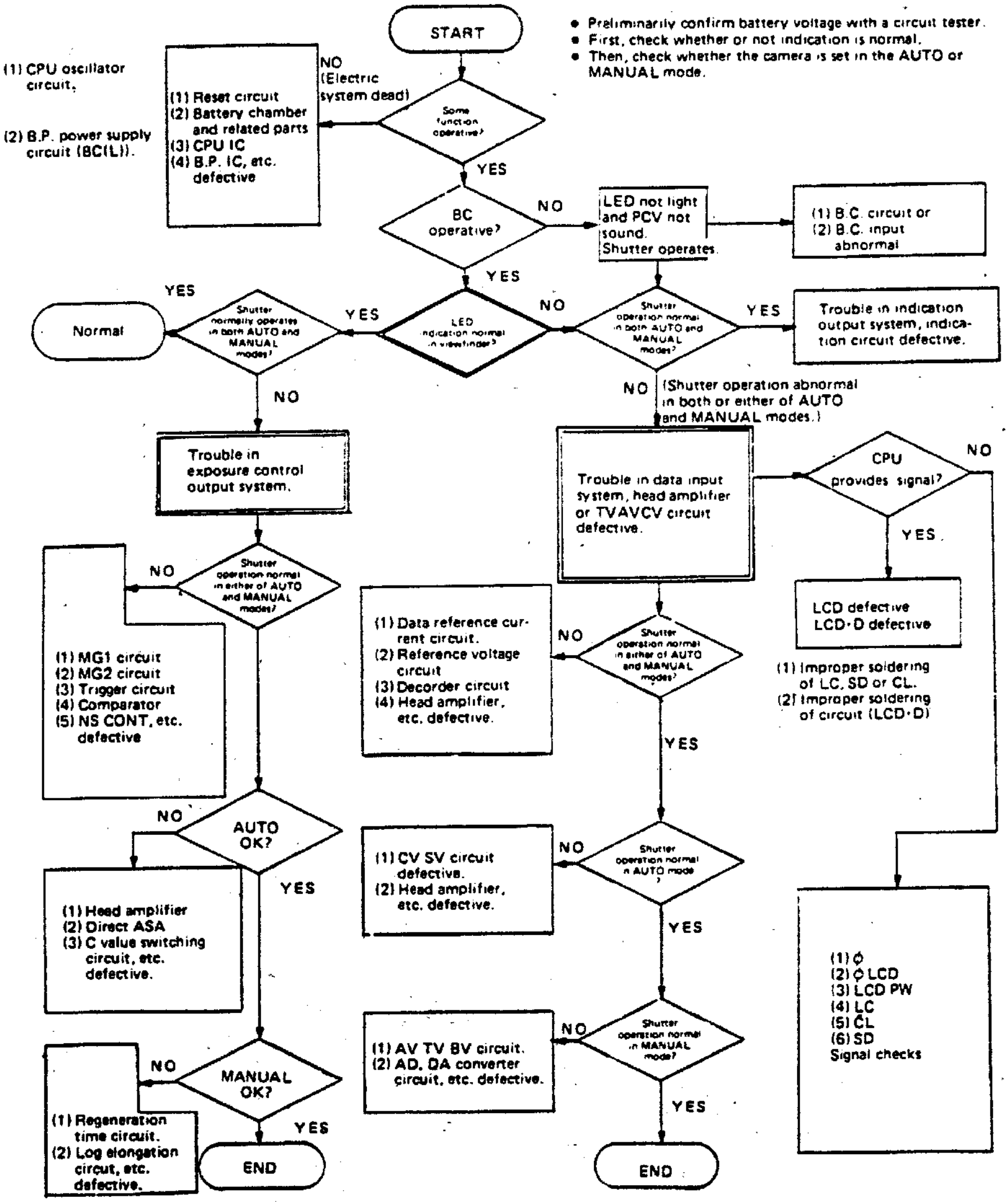
- In the slef-timer circuit, pattern may be broken or IC may be defective if the AUTO, MANUAL and B.C. circuits are normal after:
  1. Detaching the top cover.
  2. Disconnecting lead wires for the self-timer mode.
  3. Setting the camera in the SELF mode by using tweezers.



IV. TROUBLESHOOTING OF ELECTRIC SYSTEM

1. Diagnosis Flow Chart

- The diagnosis flow chart is given on a premise that the mechanical system can operate normally.
- After understanding symptom correctly, check the electric system in the sequence illustrated by the following flow chart.



2. Troubleshooting Flow Charts

2-1. Electrical System Inoperative

- B.C. circuit, shutter and all other circuits do not operate

1. Power circuit, shutter and all other circuits do not operate — E-95
   - ● Detach top cover
   - ● Measure voltage across camera body and (−) terminal
   - → Battery capacity too small — E-95
   - → (−) lead wire of power supply broken — E-95

* Check whether or not 1.8V ± 50mV is provided as Vref.
If it is 1.8V ± 50mV, the following checks are unnecessary.
When this standard is not satisfied, check in the sequence of 2 to 7 below:

2. Power not supplied to CPU — E-96
   - ● Measure voltage across pins Nos. 21 and 46 of CPU
   - → C404 shorted — E-96
   - → Pattern broken — E-96
   - → CPU: Improper soldering of pins Nos. 21 and 46 — E-97

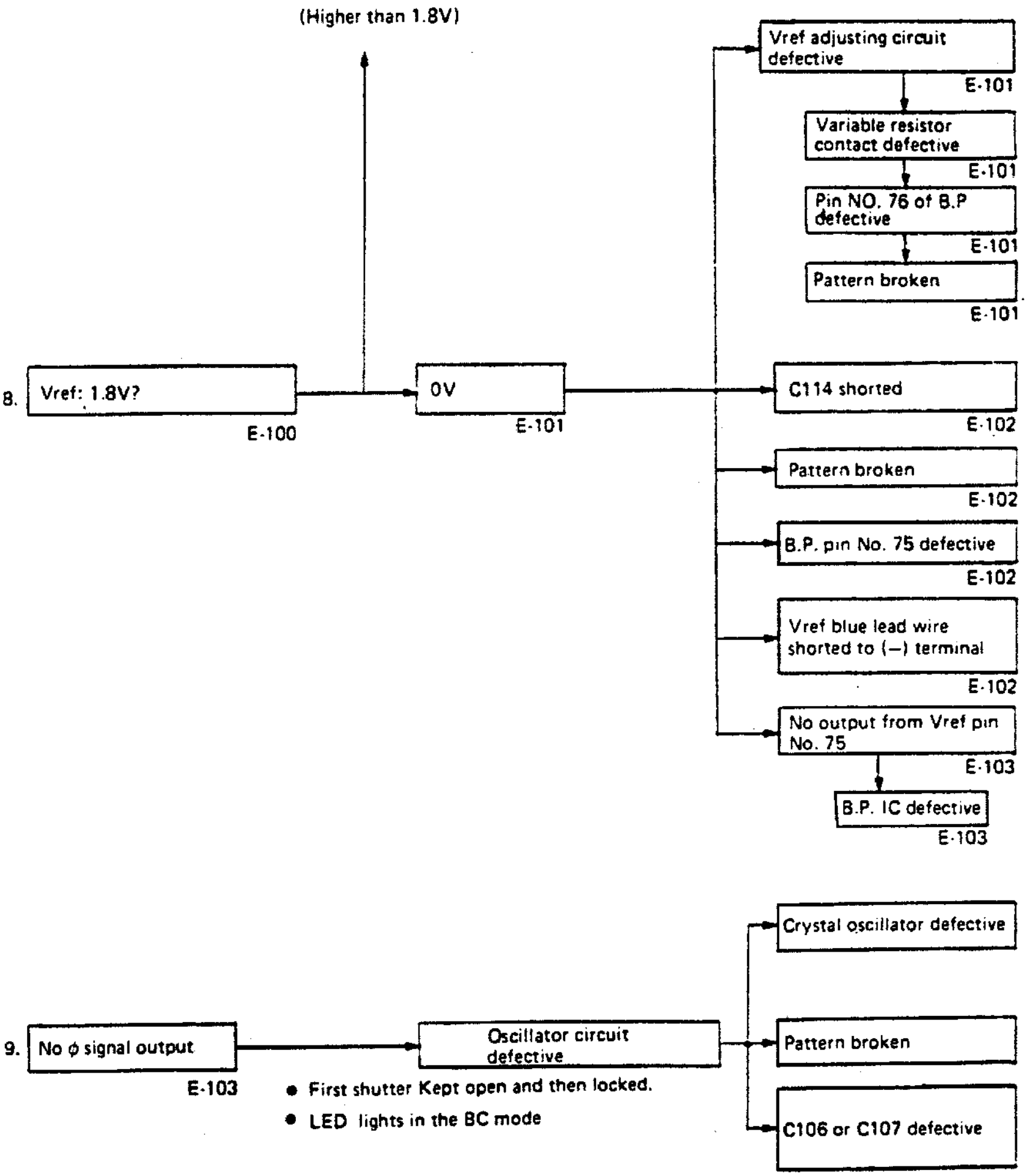
3. Power not supplied to B.P. — E-97
   - ● Measure voltage across pins Nos. 26, 51 and 62 of B.P.
   - → Pattern broken — E-97
   - → B.P.: Improper soldering of pins Nos. 26, 51 and 62 — E-97

4. Reset conditions not released — E-98
   - ● PCV sounds.
   - ● Check voltage on pin No. 43 of CPU (or RS lead wire (G))
   - → Reset circuit defective B.P. IC defective — E-98
   - → Shorting between C902(−) and power supply (−) — E-98

5. CPU: No power and HB output — E-98
   - ● Measure voltage across pins Nos. 53 and 56 of CPU
   - → CPU: Improper soldering of pins Nos. 53 and 56 — E-99
   - → CPU IC defective — E-99

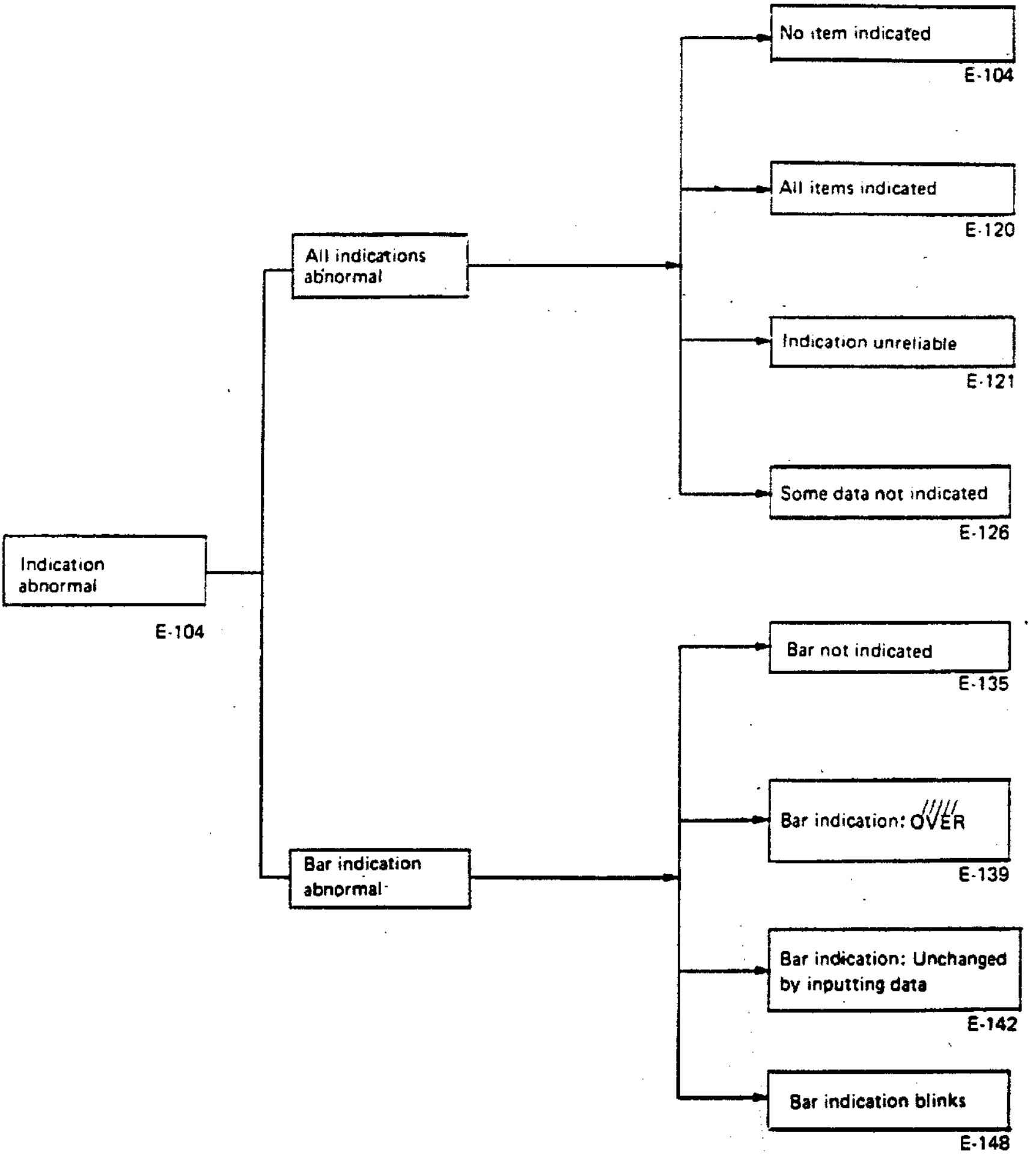
6. B.P.: No power and HB input — E-99
   - ● Measure voltage across pins Nos. 21 and 24 of B.P.
   - → B.P.: Improper soldering of pins Nos. 21 and 24. — E-99
   - → Pattern broken — E-99

7. Vref: 1.8? — E-100
   - → Higher than 1.8V — E-100
     - → TVAV circuit: Shorting between lead wire and camera body — E-100
     - → B.P. IC defective — E-100


(Higher than 1.8V)
8.
Vref: 1.8V?
E-100
0V
E-101
Vref adjusting circuit defective
E-101
Variable resistor contact defective
E-101
Pin NO. 76 of B.P defective
E-101
Pattern broken
E-101
C114 shorted
E-102
Pattern broken
E-102
B.P. pin No. 75 defective
E-102
Vref blue lead wire shorted to (–) terminal
E-102
No output from Vref pin No. 75
E-103
B.P. IC defective
E-103
9.
No ϕ signal output
E-103
Oscillator circuit defective
● First shutter Kept open and then locked.
● LED lights in the BC mode
Crystal oscillator defective
Pattern broken
C106 or C107 defective

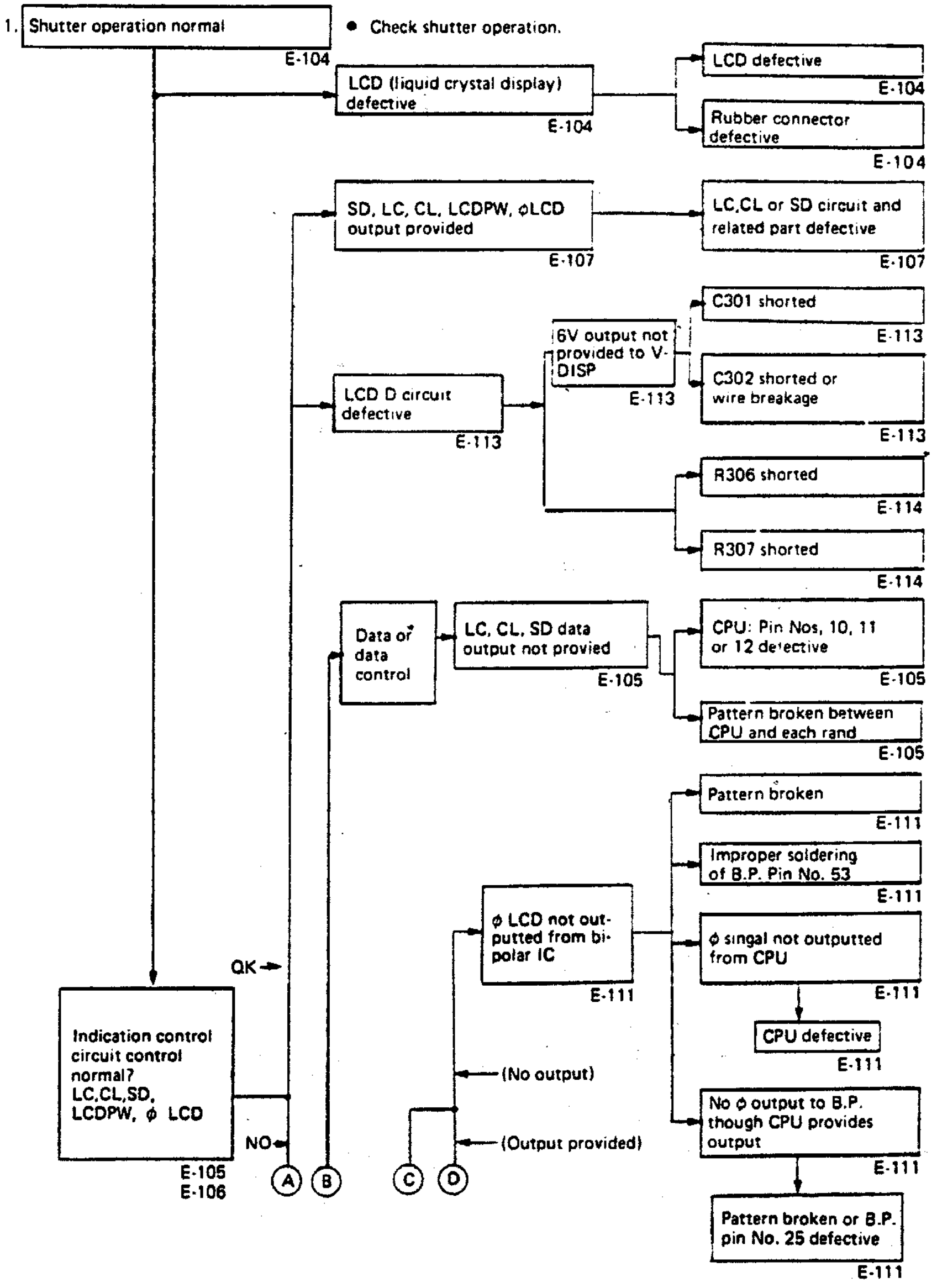
2-2. LCD Indication Abnormal

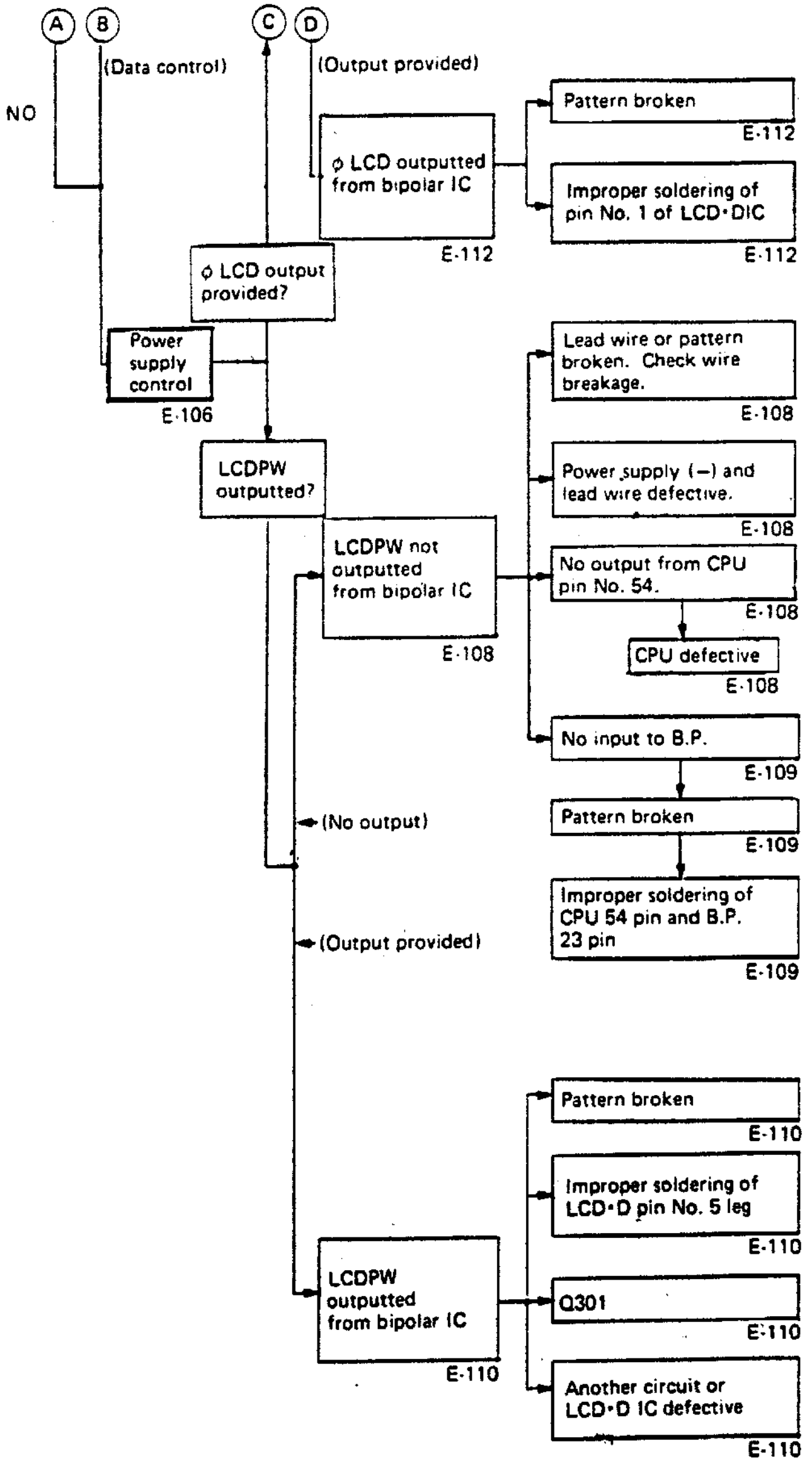
- Diagnosis flow chart for abnormal indication

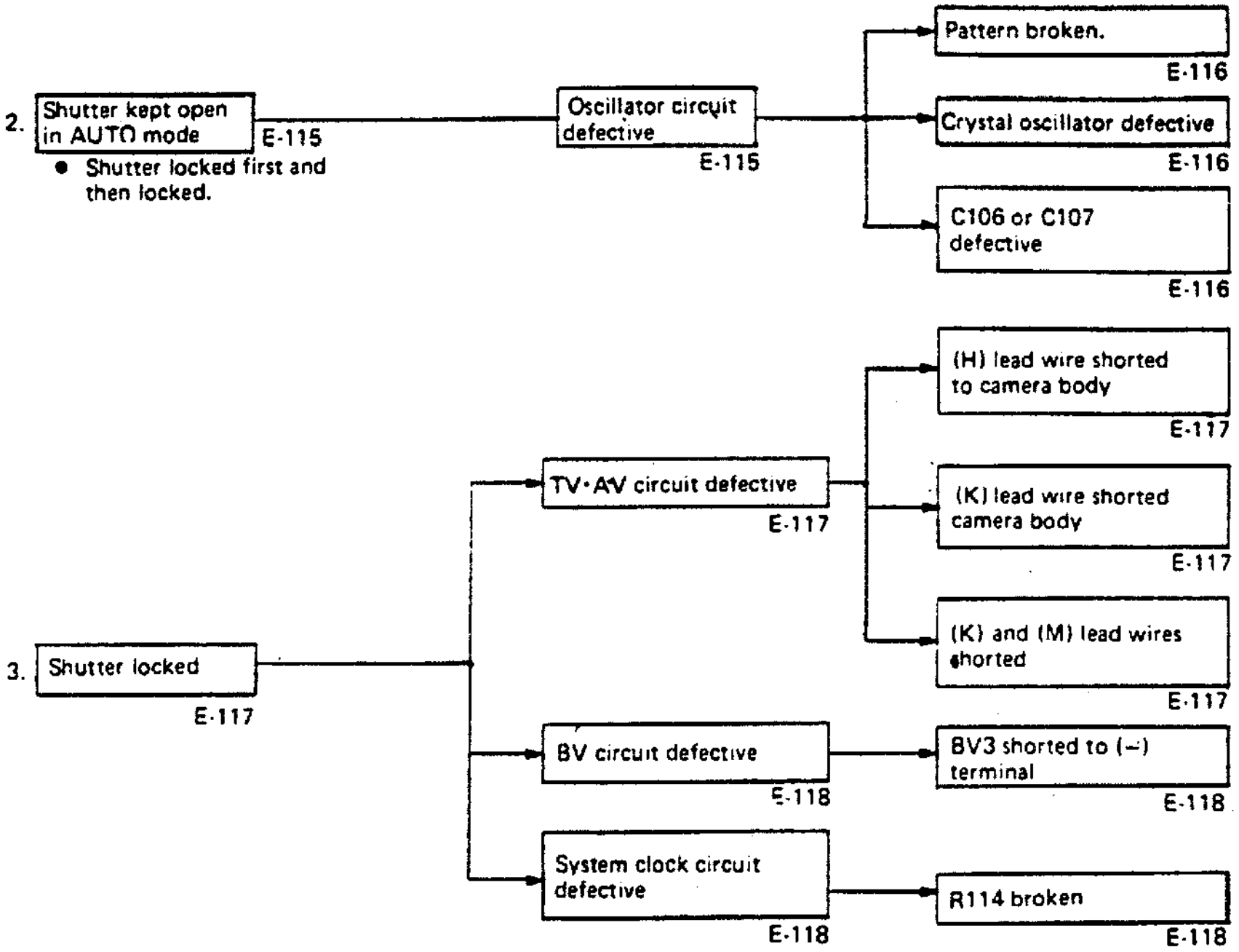


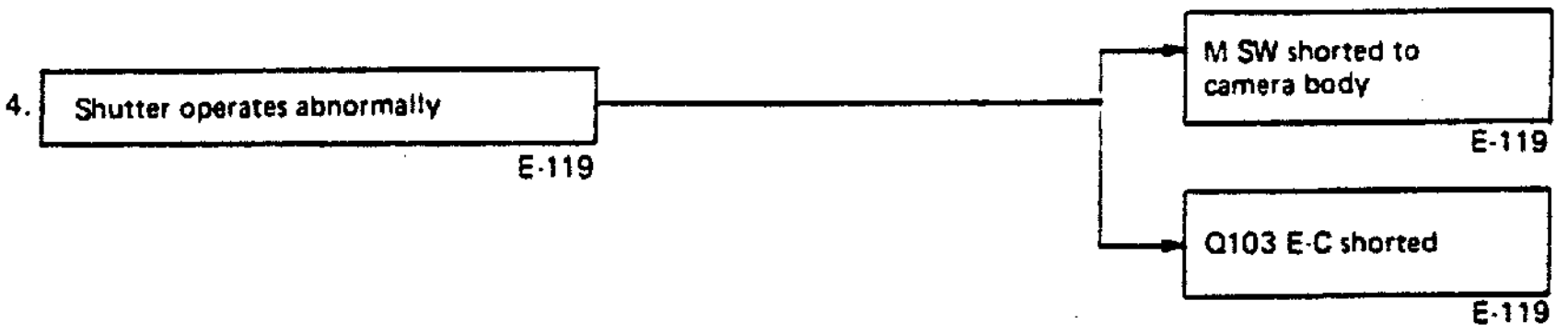
(1) No item displayed

- No character or symbol displayed

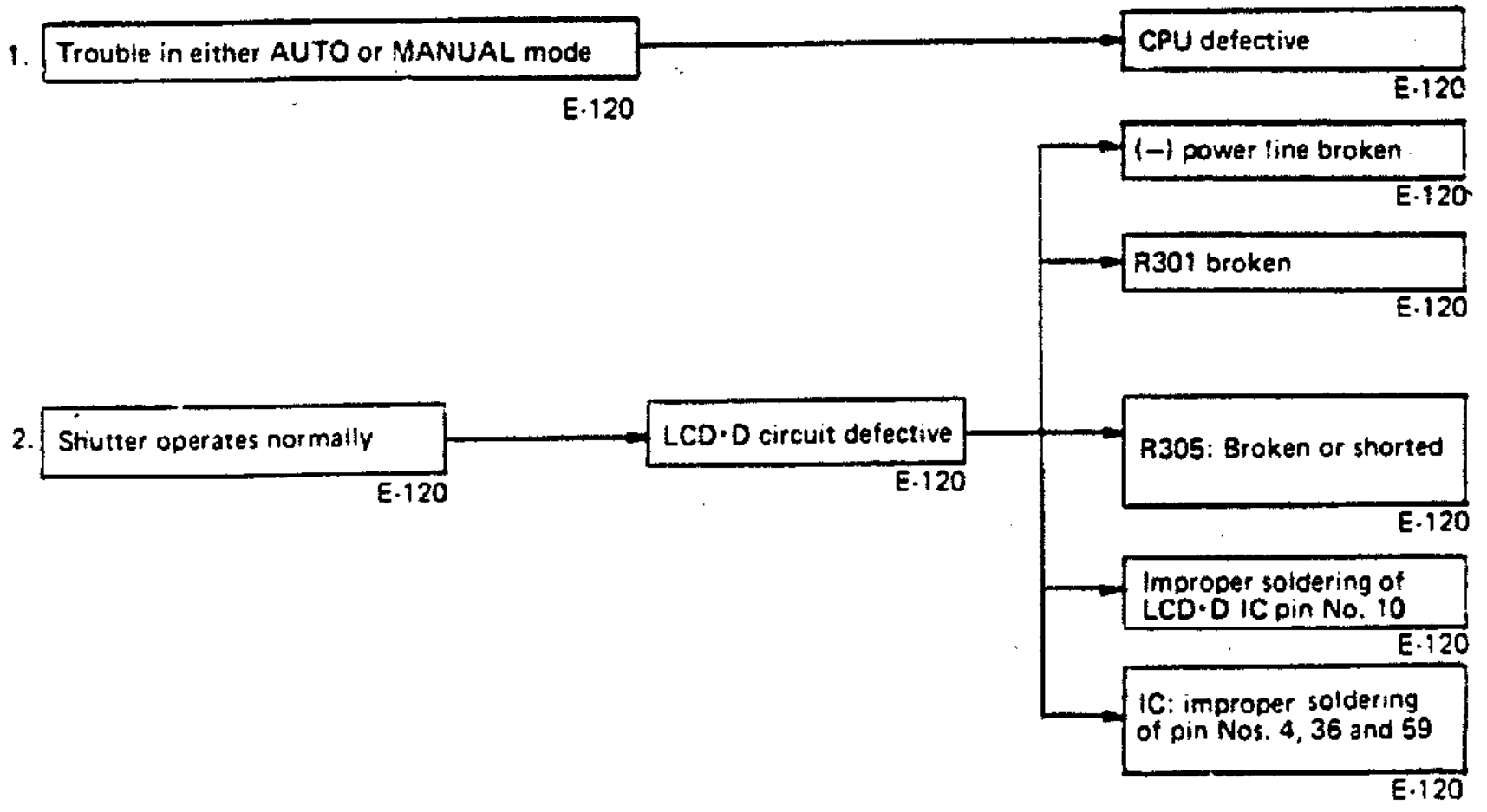



A
B
C
D
(Data control)
(Output provided)
NO
Pattern broken
E-112
ϕ LCD outputted from bipolar IC
Improper soldering of pin No. 1 of LCD•DIC
E-112
E-112
ϕ LCD output provided?
Power supply control
E-106
Lead wire or pattern broken. Check wire breakage.
E-108
LCDPW outputted?
Power supply (−) and lead wire defective.
E-108
LCDPW not outputted from bipolar IC
E-108
No output from CPU pin No. 54.
E-108
CPU defective
E-108
No input to B.P.
E-109
(No output)
Pattern broken
E-109
Improper soldering of CPU 54 pin and B.P. 23 pin
E-109
(Output provided)
Pattern broken
E-110
Improper soldering of LCD•D pin No. 5 leg
E-110
LCDPW outputted from bipolar IC
E-110
Q301
E-110
Another circuit or LCD•D IC defective
E-110


2.
Shutter kept open in AUTO mode
E-115
● Shutter locked first and then locked.
Oscillator circuit defective
E-115
Pattern broken.
E-116
Crystal oscillator defective
E-116
C106 or C107 defective
E-116
3.
Shutter locked
E-117
TV·AV circuit defective
E-117
BV circuit defective
E-118
System clock circuit defective
E-118
(H) lead wire shorted to camera body
E-117
(K) lead wire shorted camera body
E-117
(K) and (M) lead wires shorted
E-117
BV3 shorted to (–) terminal
E-118
R114 broken
E-118

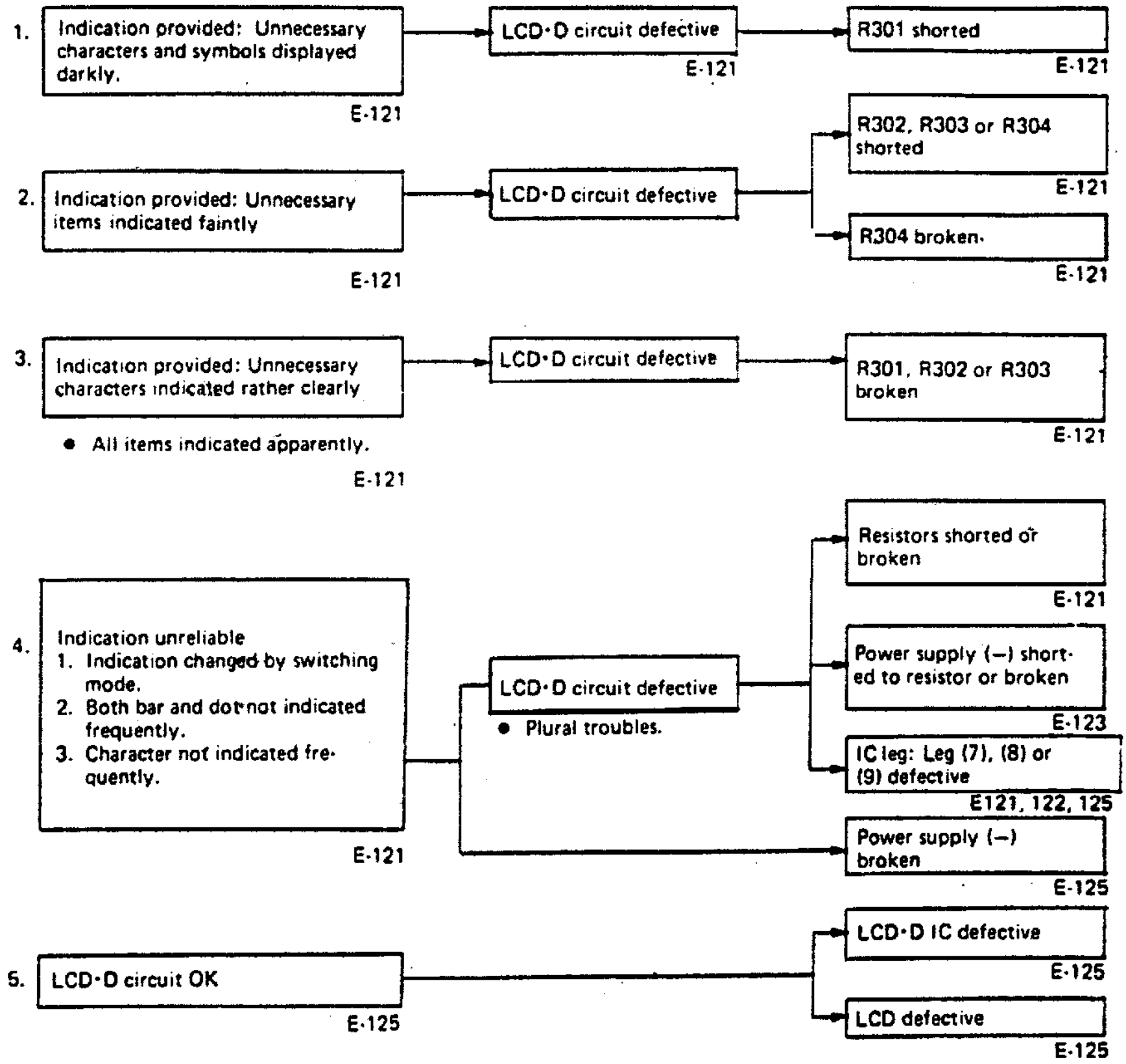

4.
Shutter operates abnormally
E-119
M SW shorted to camera body
E-119
Q103 E-C shorted
E-119

(2) All items indicated



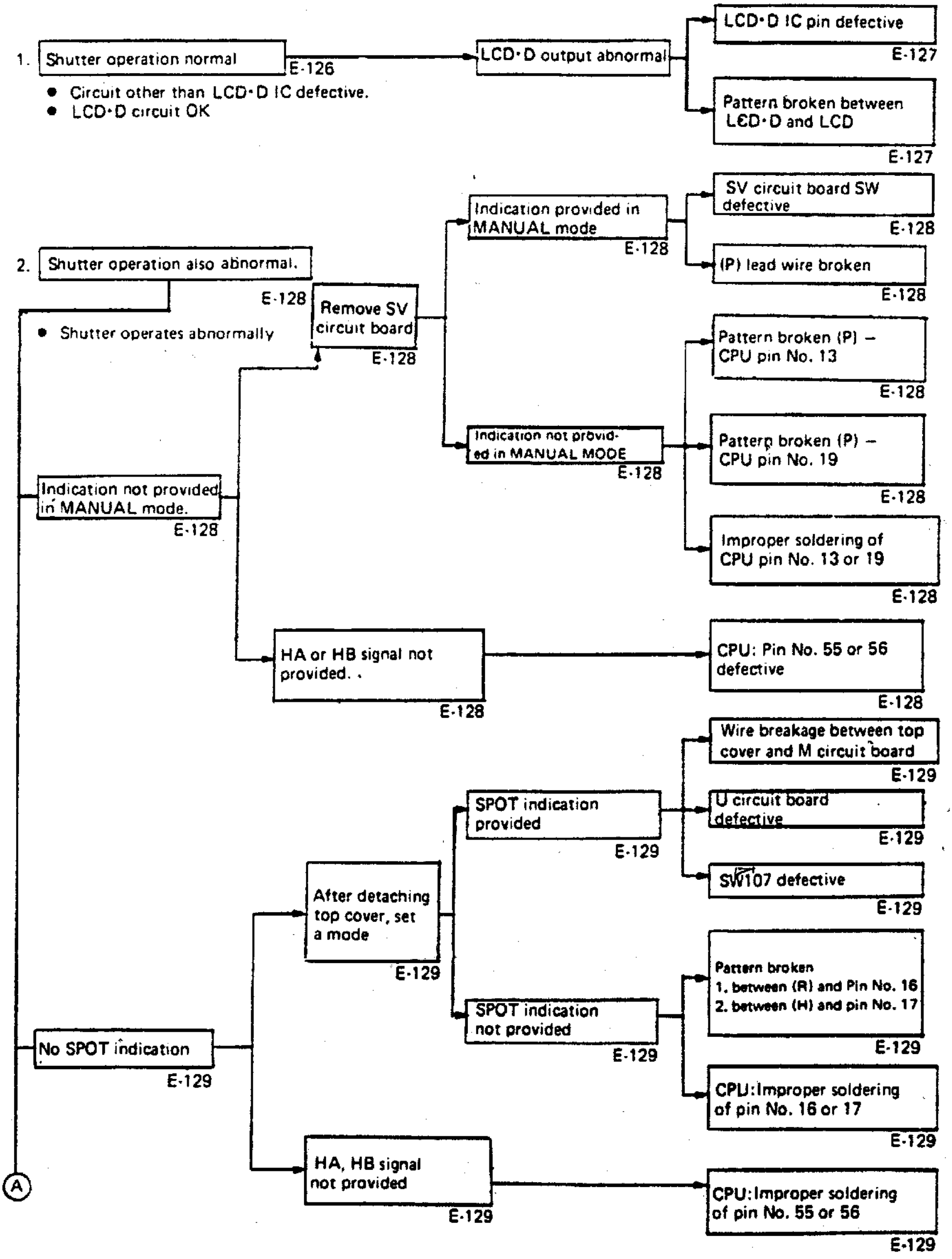
(3) Indication unreliable

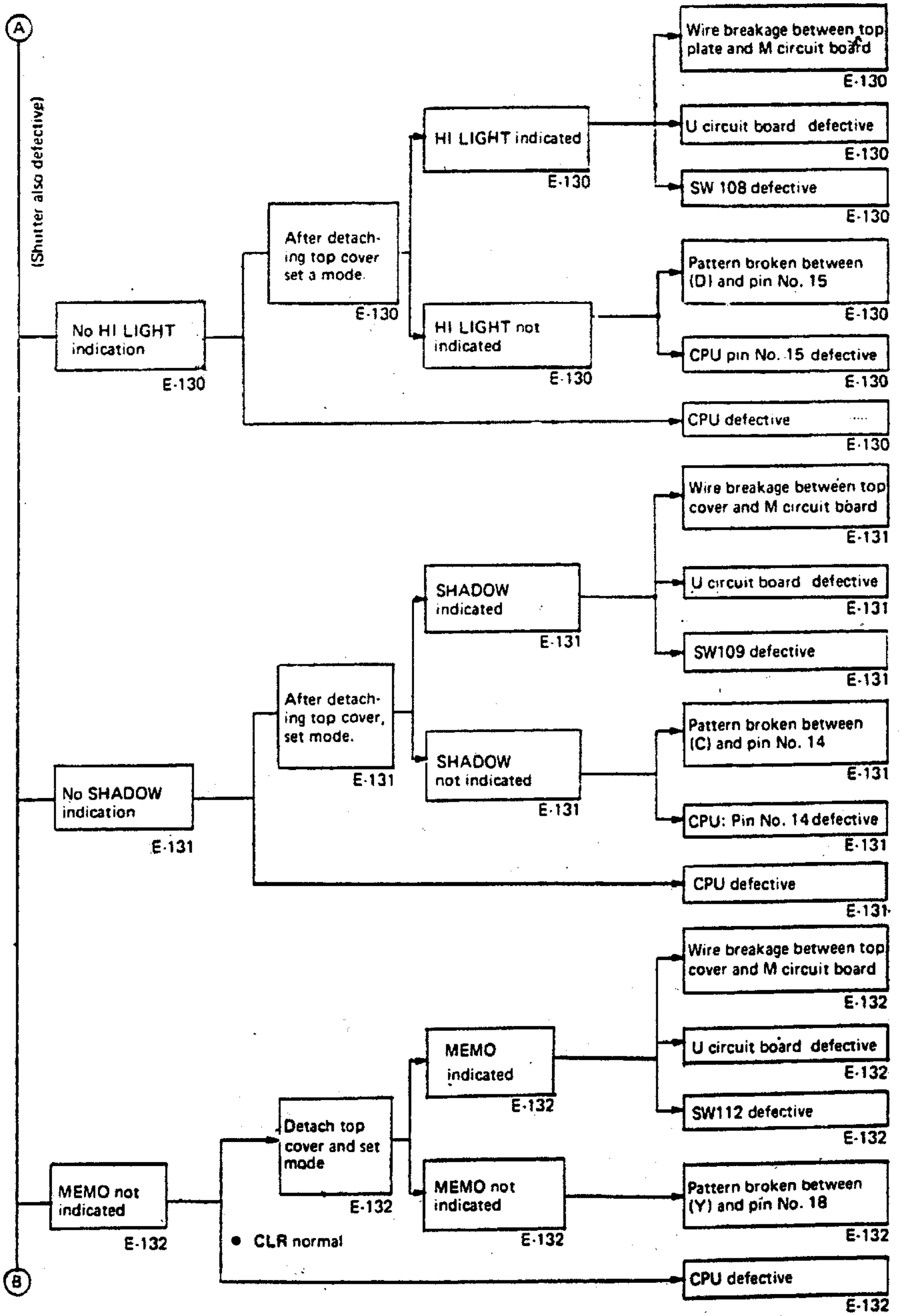
- All items not indicated but unnecessary items indicated.
- Indication unstable and changed by switching mode.
- Shutter operates normally.

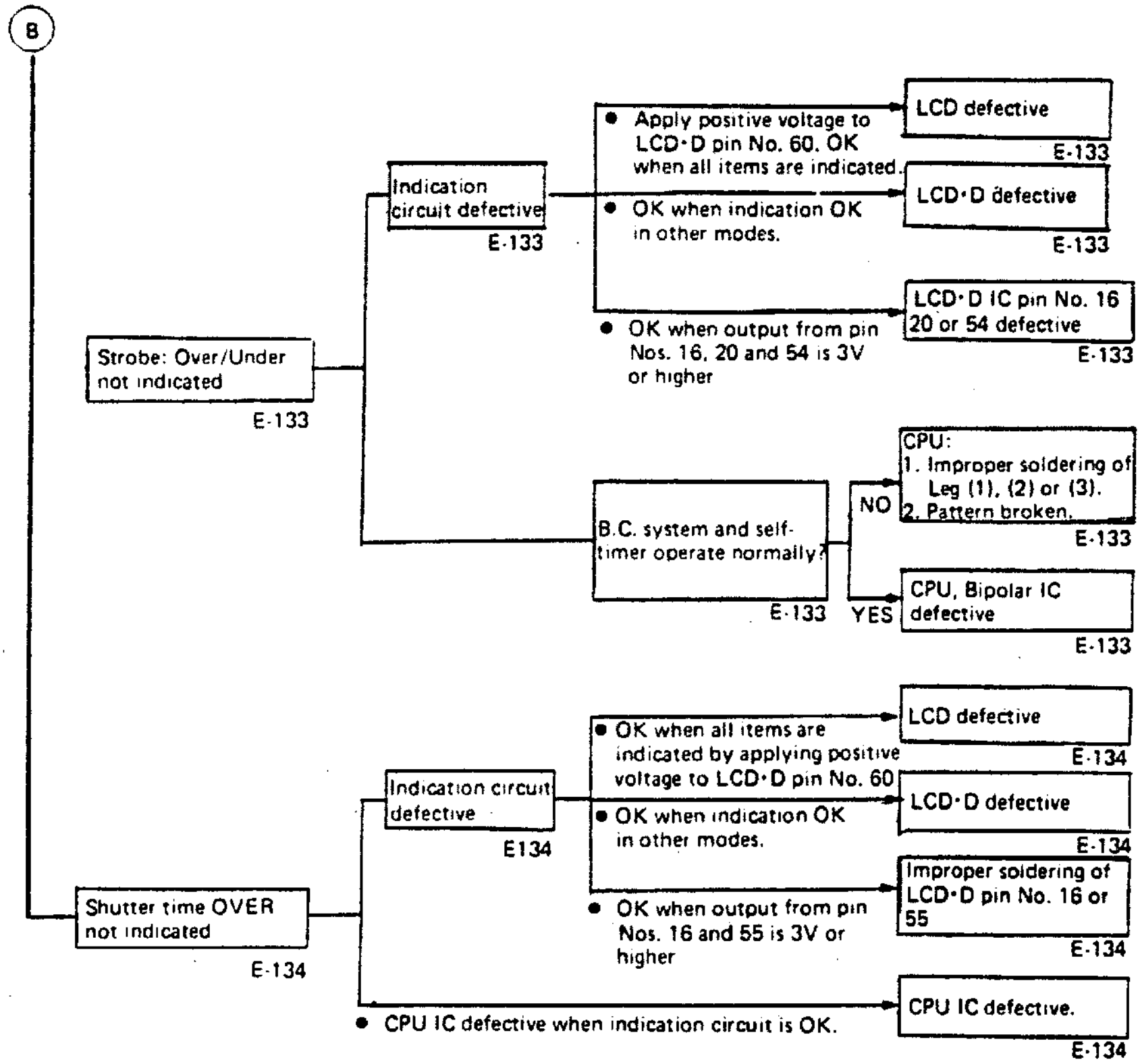


(4) Some items not indicated

- Necessary items not indicated




A
(Shutter also defective)
No HI LIGHT indication
E-130
After detaching top cover set a mode.
E-130
HI LIGHT indicated
E-130
Wire breakage between top plate and M circuit board
E-130
U circuit board defective
E-130
SW 108 defective
E-130
HI LIGHT not indicated
E-130
Pattern broken between (D) and pin No. 15
E-130
CPU pin No. 15 defective
E-130
CPU defective
E-130
No SHADOW indication
E-131
After detaching top cover, set mode.
E-131
SHADOW indicated
E-131
Wire breakage between top cover and M circuit board
E-131
U circuit board defective
E-131
SW109 defective
E-131
SHADOW not indicated
E-131
Pattern broken between (C) and pin No. 14
E-131
CPU: Pin No. 14 defective
E-131
CPU defective
E-131
MEMO not indicated
E-132
Detach top cover and set mode
E-132
MEMO indicated
E-132
Wire breakage between top cover and M circuit board
E-132
U circuit board defective
E-132
SW112 defective
E-132
MEMO not indicated
E-132
Pattern broken between (Y) and pin No. 18
E-132
● CLR normal
CPU defective
E-132
B


B
Strobe: Over/Under not indicated
E-133
Indication circuit defective
E-133
Apply positive voltage to LCD·D pin No. 60. OK when all items are indicated.
LCD defective
E-133
OK when indication OK in other modes.
LCD·D defective
E-133
OK when output from pin Nos. 16, 20 and 54 is 3V or higher
LCD·D IC pin No. 16 20 or 54 defective
E-133
B.C. system and self-timer operate normally?
E-133
NO
CPU:
1. Improper soldering of Leg (1), (2) or (3).
2. Pattern broken.
E-133
YES
CPU, Bipolar IC defective
E-133
Shutter time OVER not indicated
E-134
Indication circuit defective
E134
OK when all items are indicated by applying positive voltage to LCD·D pin No. 60
LCD defective
E-134
OK when indication OK in other modes.
LCD·D defective
E-134
OK when output from pin Nos. 16 and 55 is 3V or higher
Improper soldering of LCD·D pin No. 16 or 55
E-134
CPU IC defective when indication circuit is OK.
CPU IC defective.
E-134

(5) Bar indication not provided

- Indication circuit is defective when shutter operates normally.
- When shutter operation is also abnormal, perform the following checks.

TV, AV circuit defective
E-135
● Shutter speed indication remains at 1/2000 and cannot be changed in MANUAL mode.
→ (M) shorted to (–) power supply
E-135

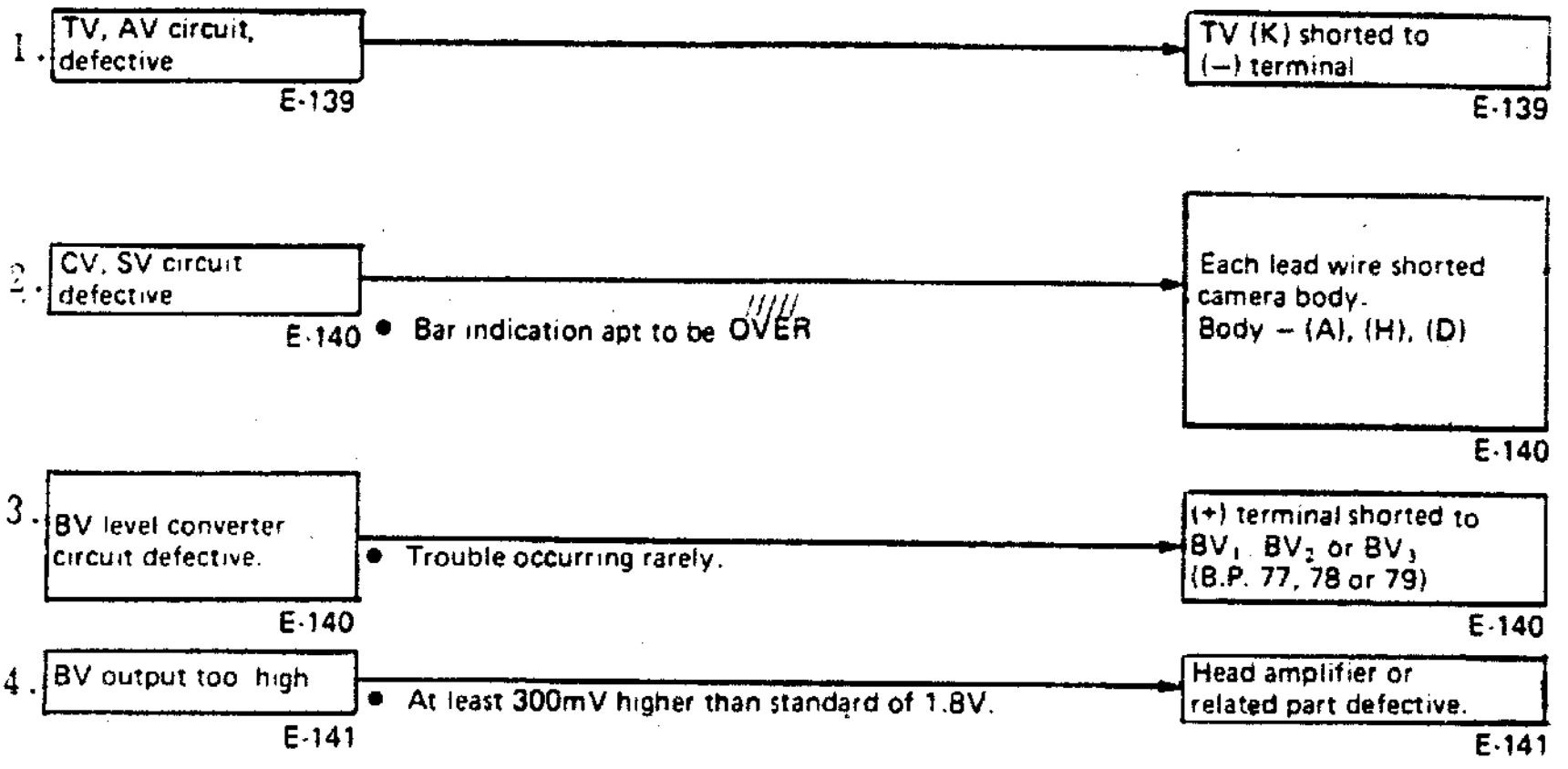
2. CV SV circuit defective
E-136
● Lead wire defective when bar is indicated after disconnecting each lead wire.
→ Shorting between (H) and (A) lead wires
E-136
→ (H) shorted to (–) power supply
E-136
→ (A) shorted to (–) power supply
E-136

3. Check BV input
E-136
● Measure BV_1 voltage for simple check.
○ BV input provided? Input applied to B.P. leg No. 7?
YES → BV level converter circuit defective
See page E-151, E-136
NO → Head amplifier defective
See page E-137, E-136

4. BV level converter circuit defective.
E-137
● BV input provided.
→ RV105 or 106 defective
E-137
→ B.P.: Pin No. 77, 78 or 79 defective
E-137
→ Pattern broken between B.P. IC leg and RV106
E-137
→ BV2 (B.P. 78) shorted to (–) terminal
E-137
→ BV3 (B.P. 79) shorted to RV104
E-138
→ BV1 (B.P. 77) or BV3 (B.P. 79) shorted to 1.8V line.
E-138

(6) Bar indication always OVER

- Indication circuit is defective when shutter operates normally.
- When shutter operation is also abnormal, perform the following checks.

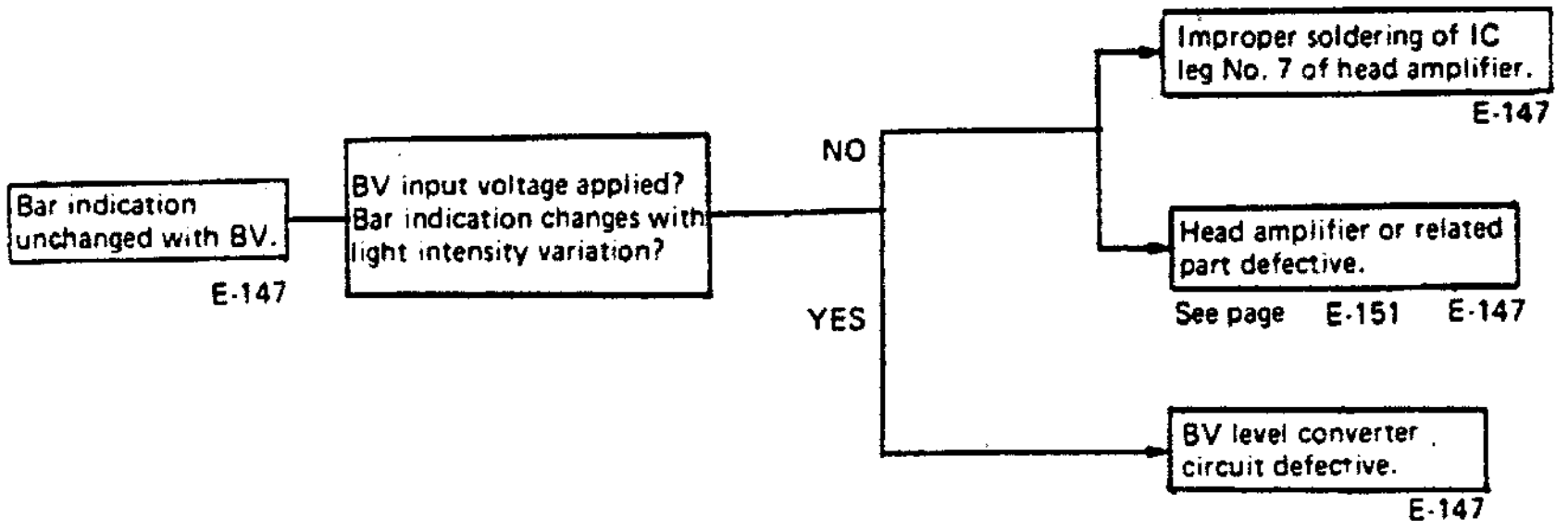


(7) Bar indication unchanged with data input

- Indication circuit is defective when shutter operation is normal.
- When shutter operation is also abnormal, perform the following checks.

1. Bar indication unchanged with AV. E-142
   - Lead wire or pattern broken. E-142
   - AV contact defective E-142
2. Bar indication unchanged with TV. E-143
   - Lead wire or pattern broken E-143
   - TV circuit board defective E-143
   - TV contact defective E-143
3. Bar indication unchnaged with TV or AV. E-144
   - TV, AV pattern or lead wire broken. E-144
   - Imporper soldering of B.P. pin No. 71 or 72. E-144
4. Bar indicatin unchanged with ASA. E-145
   - ASA contact defective E-145
   - B.P. pin No. 68 defective E-145
5. Bar indication unchanged with CV. E-145
   - CV contact defective E-145
   - B.P. pin No. 67 defective E-145
   - Pattern broken between (+) terminal and pin No. 67 E-145
   - (D) lead wire broken E-145

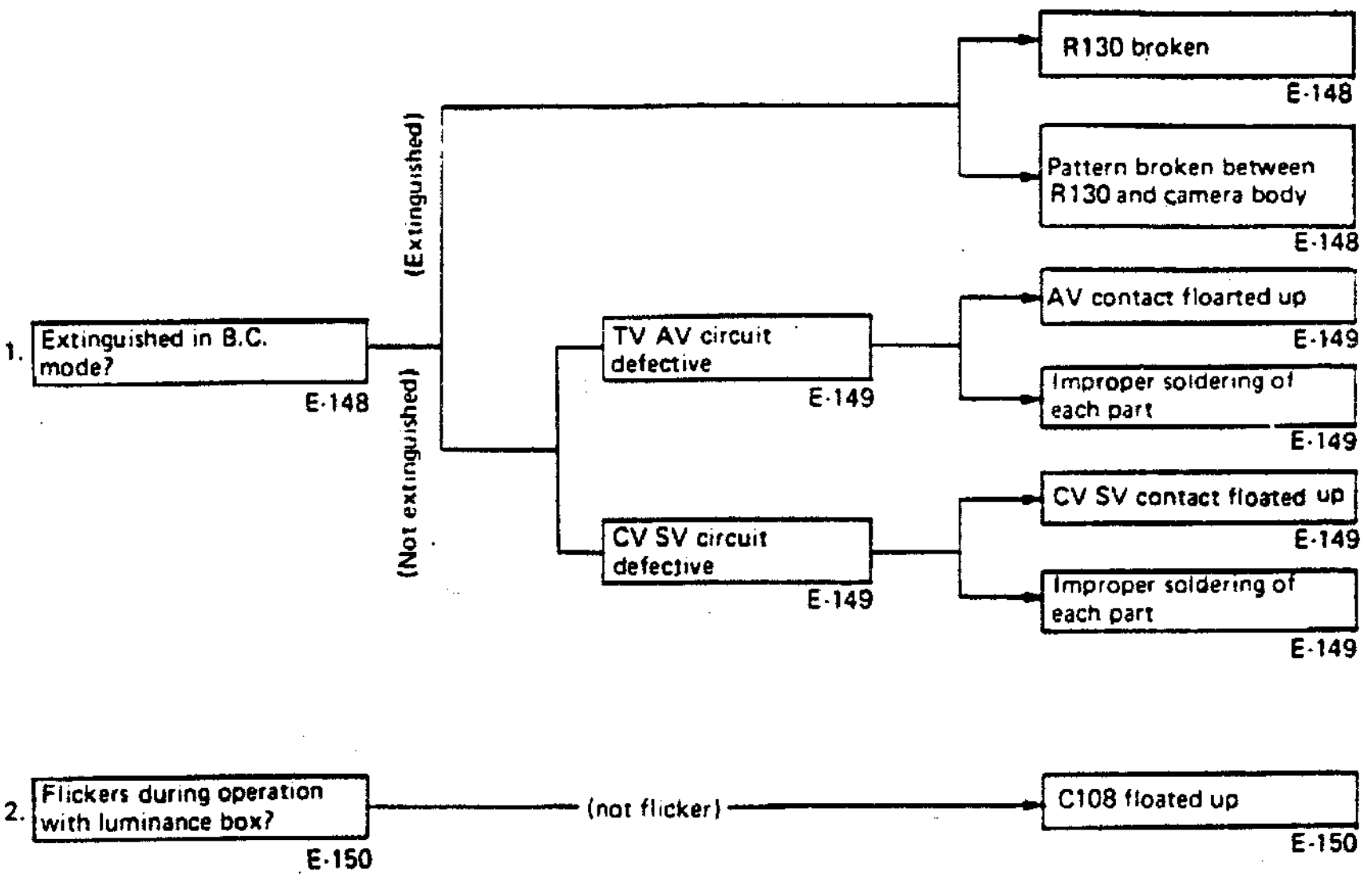
   ● Bar indication should be changed with ASA.
6. Bar. indication unchanged with CV or SV. E-146
   - Pattern or lead wire broken in (A) or (H) system E-146
   - RV110 defective E-146


Bar indication unchanged with BV.
E-147
BV input voltage applied? Bar indication changes with light intensity variation?
NO
YES
Improper soldering of IC leg No. 7 of head amplifier.
E-147
Head amplifier or related part defective.
See page E-151 E-147
BV level converter circuit defective.
E-147

(8) Bar indication flickers

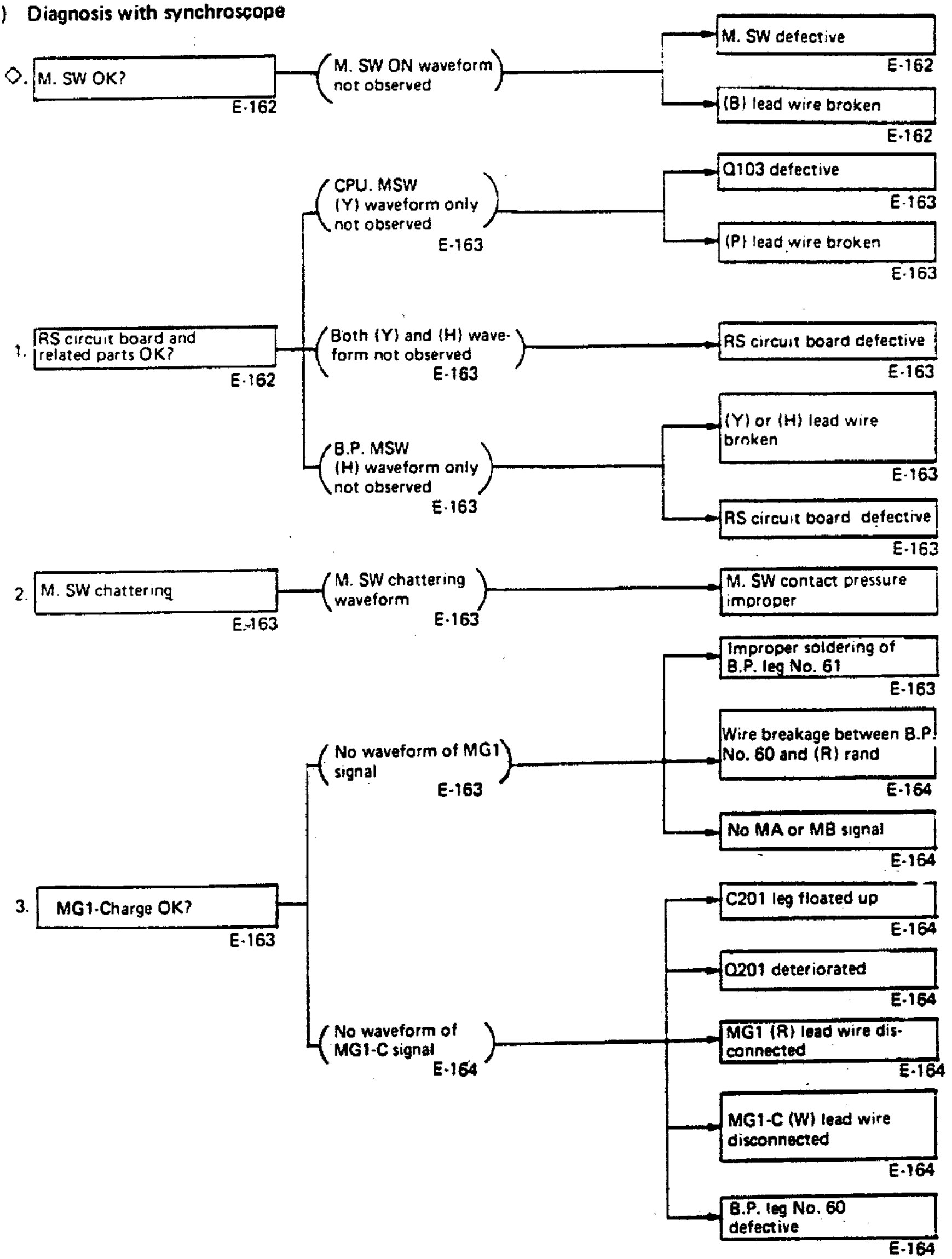
Normal:

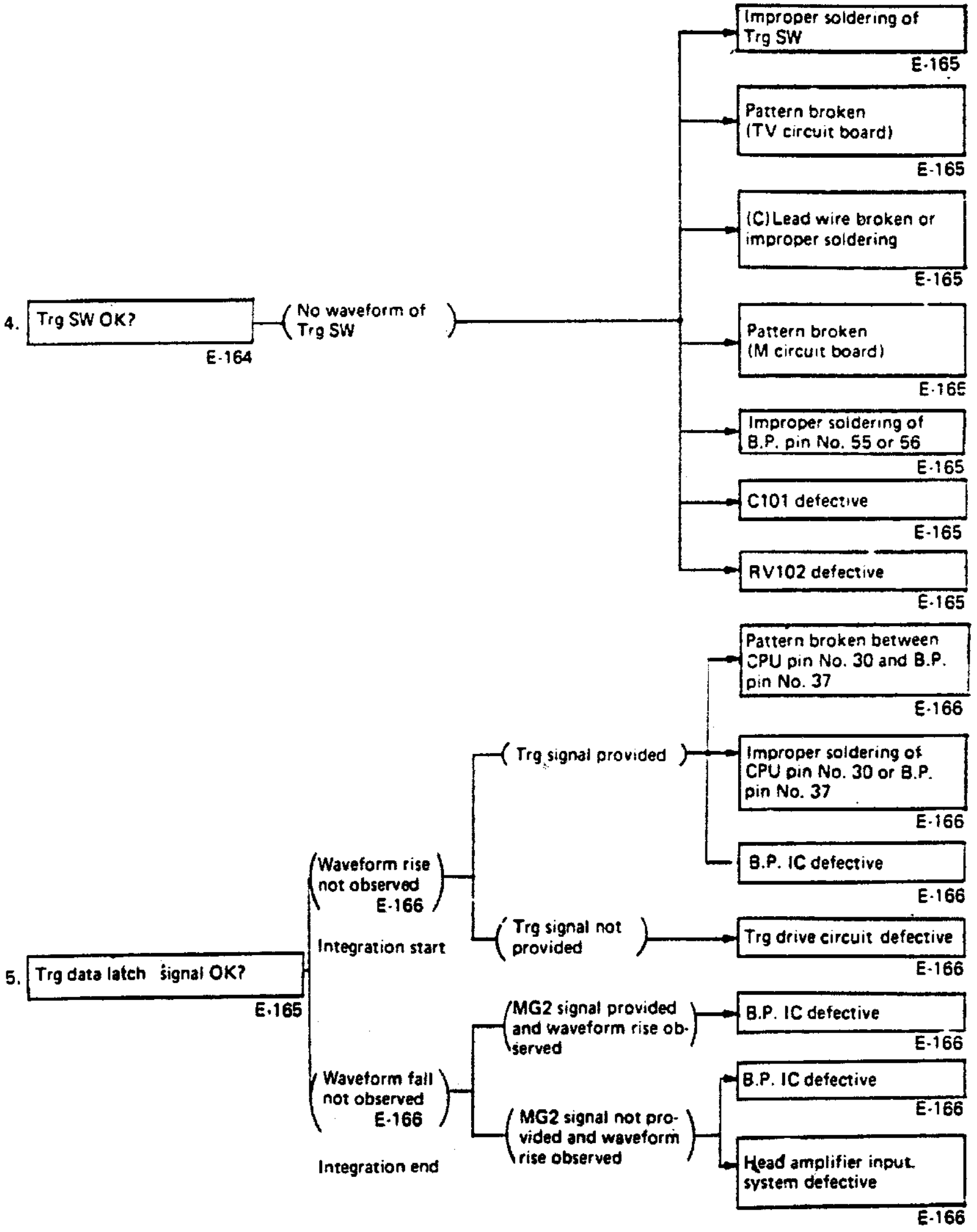
- Bar indication flickers in light from fluorescent lamp.
- Bar indication flickers when luminance varies more than 1/3 EV in day light.



2-3. Shutter Locked

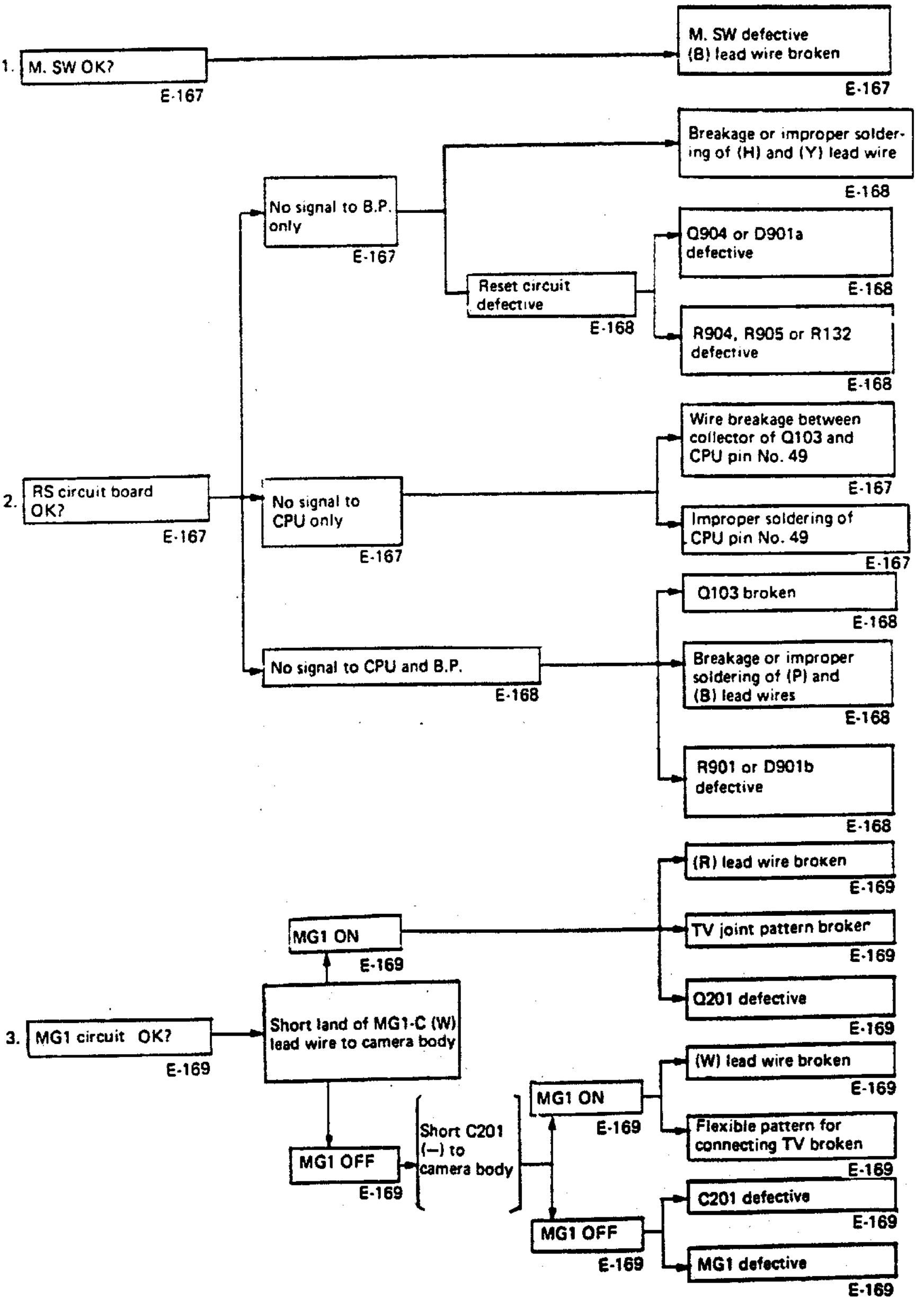
(1) Diagnosis with synchroscope

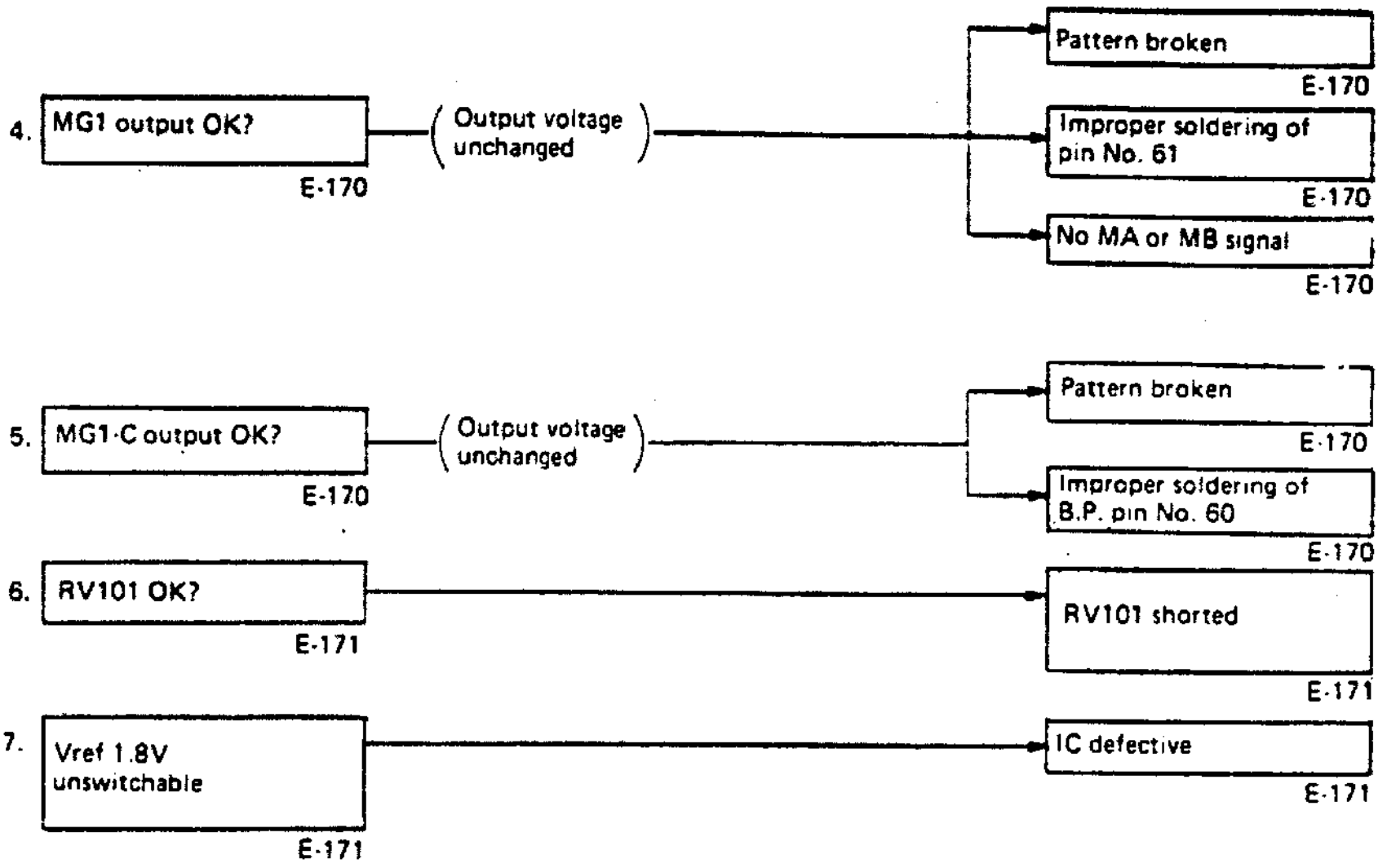

◇. M. SW OK? E-162
M. SW ON waveform not observed
M. SW defective E-162
(B) lead wire broken E-162
1. RS circuit board and related parts OK? E-162
CPU. MSW (Y) waveform only not observed E-163
Q103 defective E-163
(P) lead wire broken E-163
Both (Y) and (H) waveform not observed E-163
RS circuit board defective E-163
B.P. MSW (H) waveform only not observed E-163
(Y) or (H) lead wire broken E-163
RS circuit board defective E-163
2. M. SW chattering E-163
M. SW chattering waveform E-163
M. SW contact pressure improper
Improper soldering of B.P. leg No. 61 E-163
3. MG1-Charge OK? E-163
No waveform of MG1 signal E-163
Wire breakage between B.P. No. 60 and (R) rand E-164
No MA or MB signal E-164
No waveform of MG1-C signal E-164
C201 leg floated up E-164
Q201 deteriorated E-164
MG1 (R) lead wire disconnected E-164
MG1-C (W) lead wire disconnected E-164
B.P. leg No. 60 defective E-164


4. Trg SW OK?
E-164
No waveform of Trg SW
Improper soldering of Trg SW
E-165
Pattern broken (TV circuit board)
E-165
(C) Lead wire broken or improper soldering
E-165
Pattern broken (M circuit board)
E-165
Improper soldering of B.P. pin No. 55 or 56
E-165
C101 defective
E-165
RV102 defective
E-165
5. Trg data latch signal OK?
E-165
Waveform rise not observed
E-166
Integration start
Trg signal provided
Pattern broken between CPU pin No. 30 and B.P. pin No. 37
E-166
Improper soldering of CPU pin No. 30 or B.P. pin No. 37
E-166
B.P. IC defective
E-166
Trg signal not provided
Trg drive circuit defective
E-166
Waveform fall not observed
E-166
Integration end
MG2 signal provided and waveform rise observed
B.P. IC defective
E-166
MG2 signal not provided and waveform rise observed
B.P. IC defective
E-166
Head amplifier input system defective
E-166

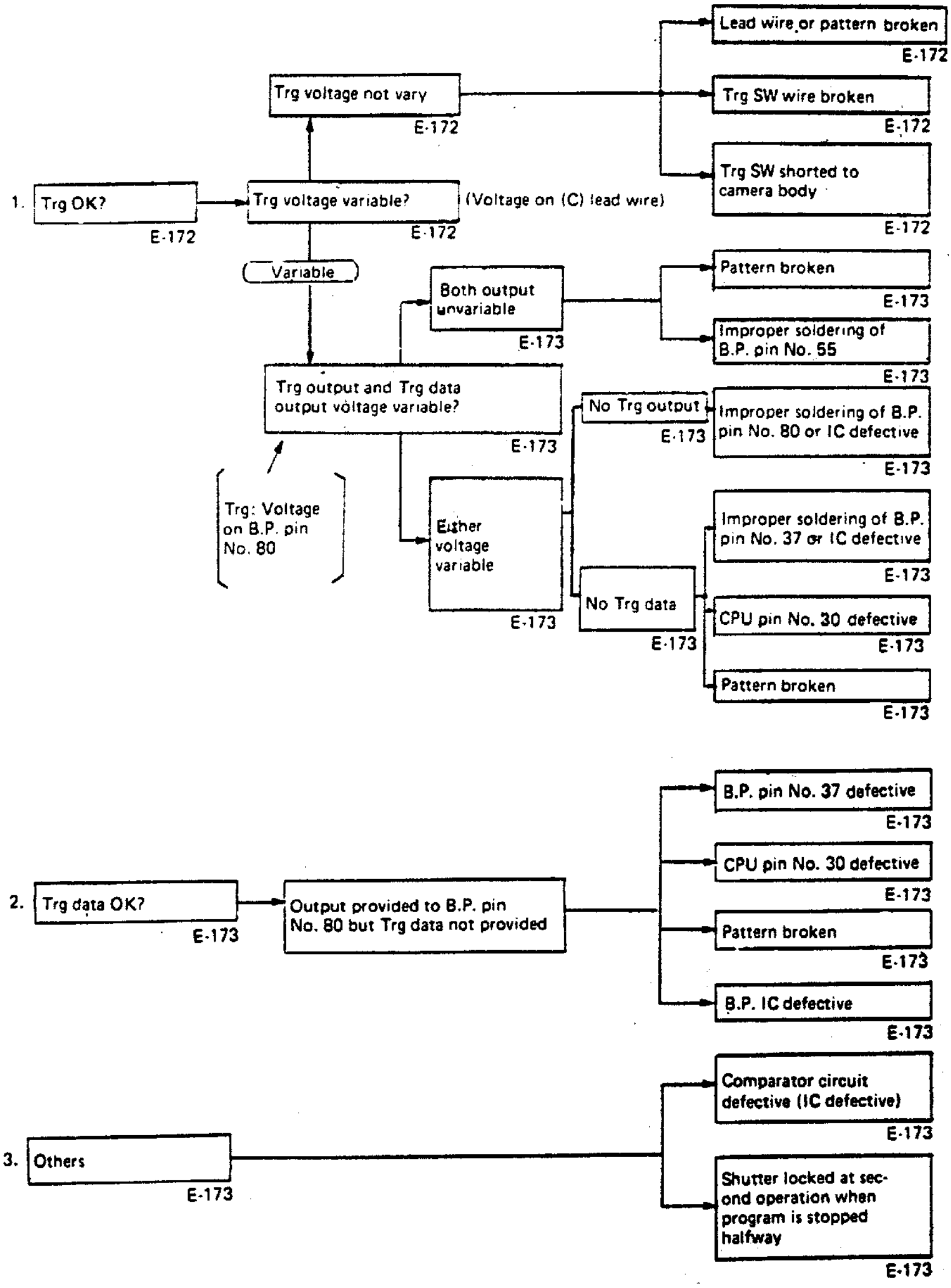
(2) Shutter locked in both AUTO and MANUAL modes

- Shutter is locked from the first though LCD indication is normal in viewfinder.




4.
MG1 output OK?
E-170
Output voltage unchanged
Pattern broken
E-170
Improper soldering of pin No. 61
E-170
No MA or MB signal
E-170
5.
MG1-C output OK?
E-170
Output voltage unchanged
Pattern broken
E-170
Improper soldering of B.P. pin No. 60
E-170
6.
RV101 OK?
E-171
RV101 shorted
E-171
7.
Vref 1.8V unswitchable
E-171
IC defective
E-171

- Shutter locked at second and later operations



- Indication also abnormal
- Correct indication

(3) Shutter locked in AUTO mode only

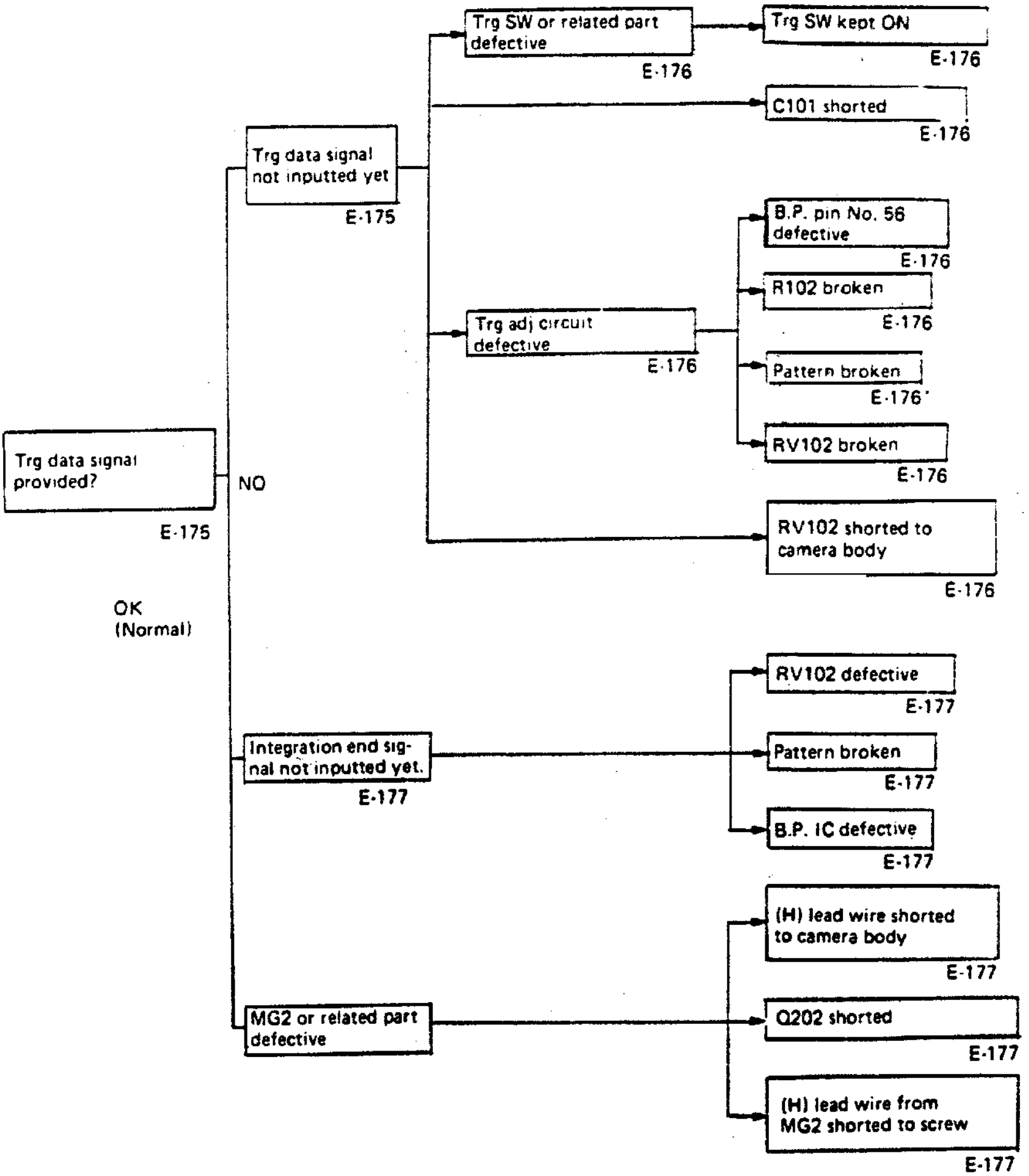
- B.P. IC defective
  See page E-174.

(4) Shutter locked in MANUAL mode only

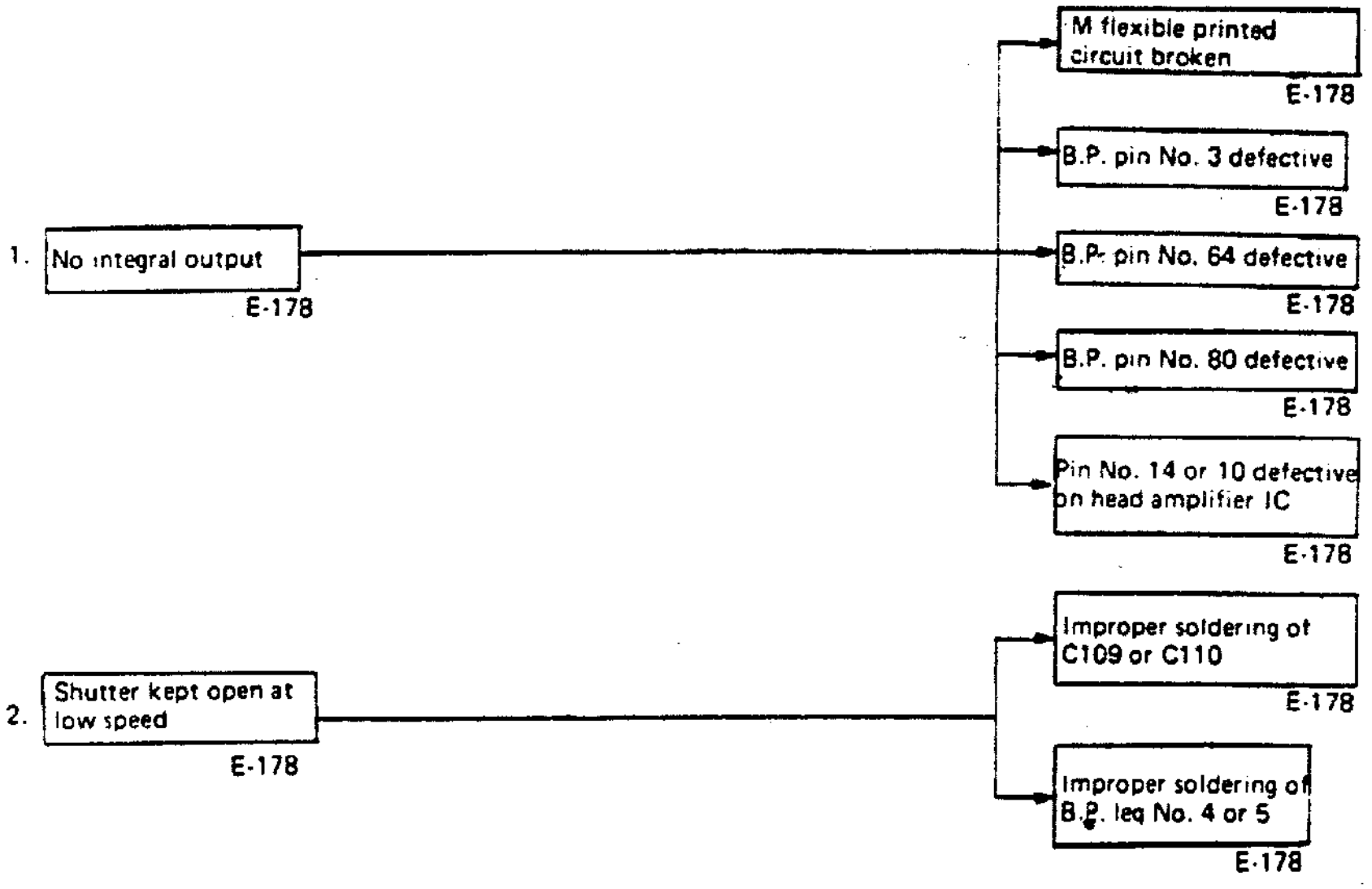
- B.P. IC defective
  See page E-174.

2-4. Shutter Kept Open

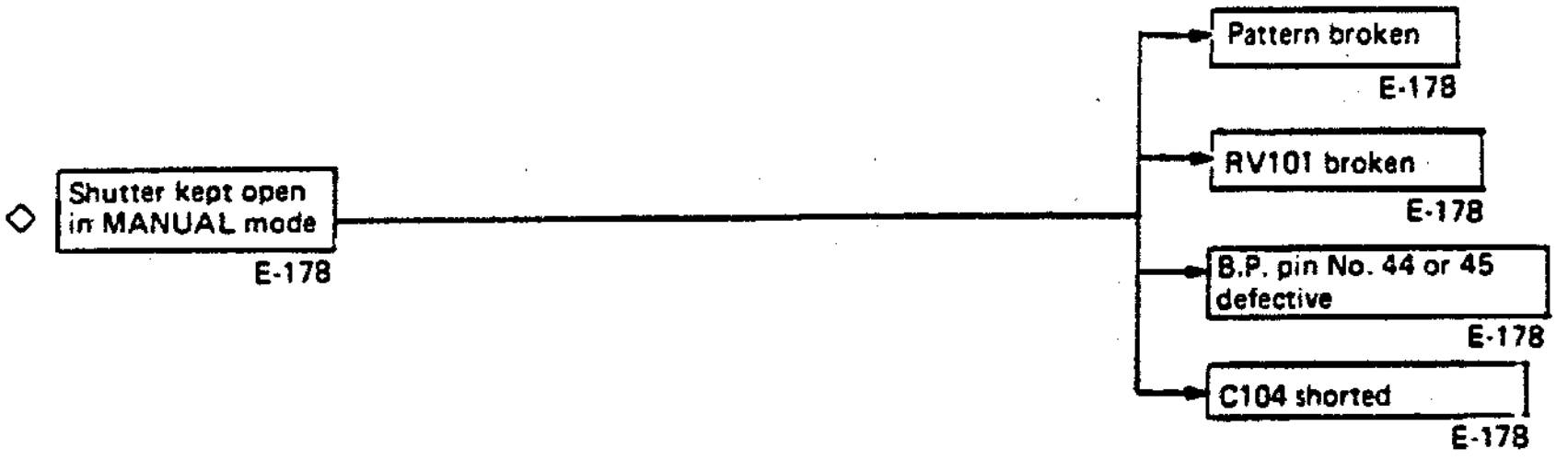
(1) Shutter left open in both AUTO and MANUAL modes



(2) Shutter kept open in AUTO mode only

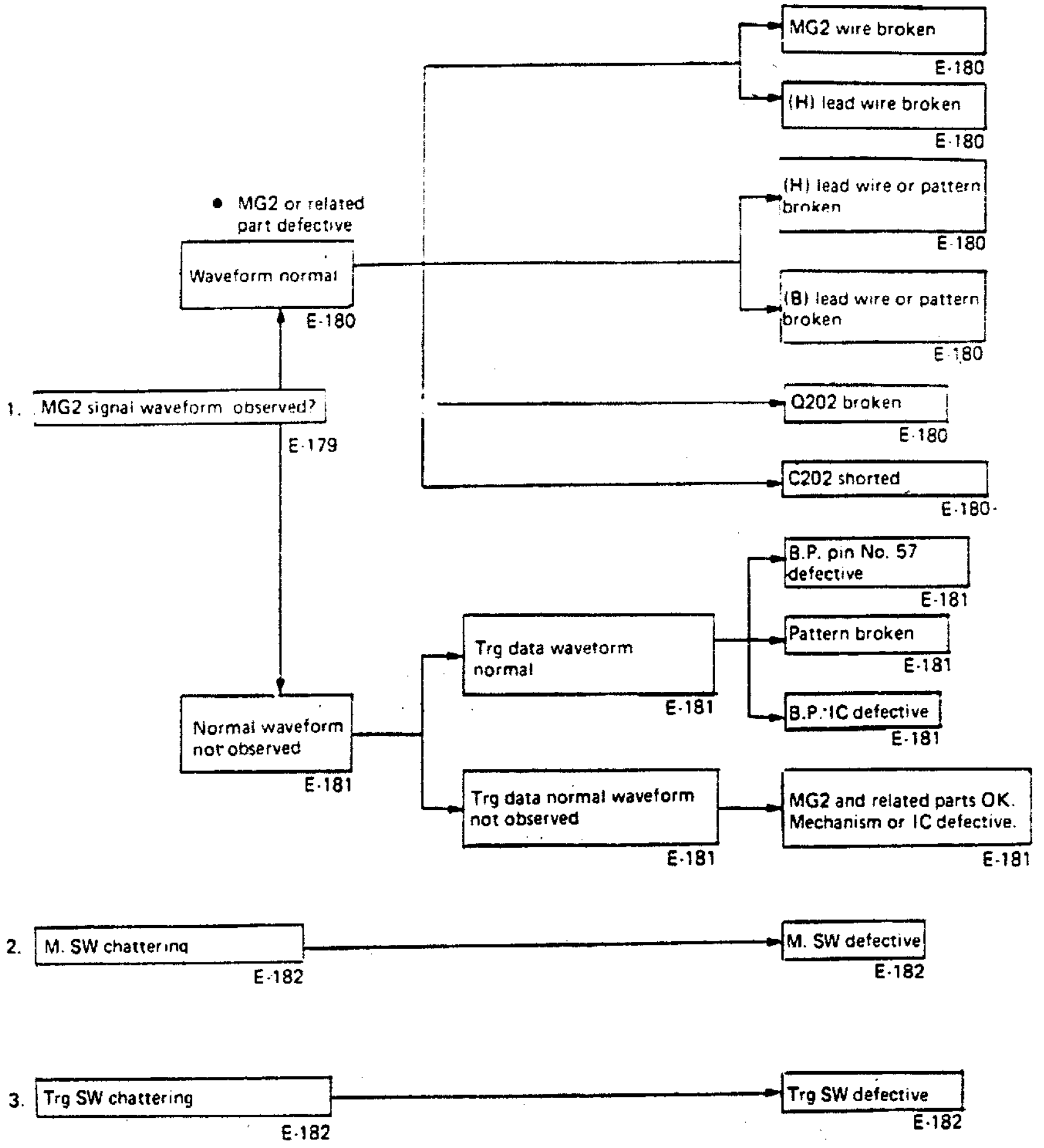


(3) Shutter kept open in MANUAL mode only

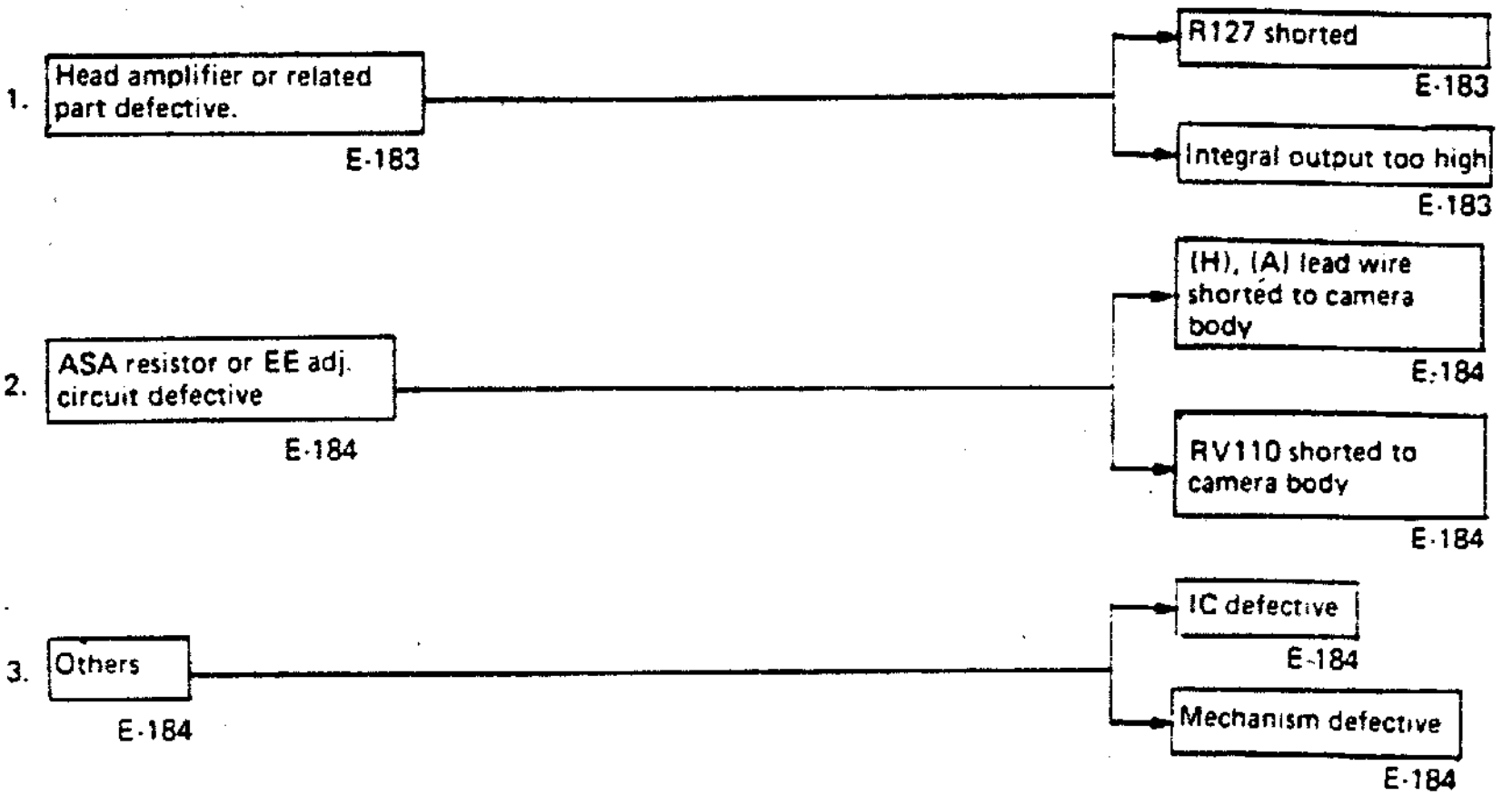


2-5. Shutter Speed Too High

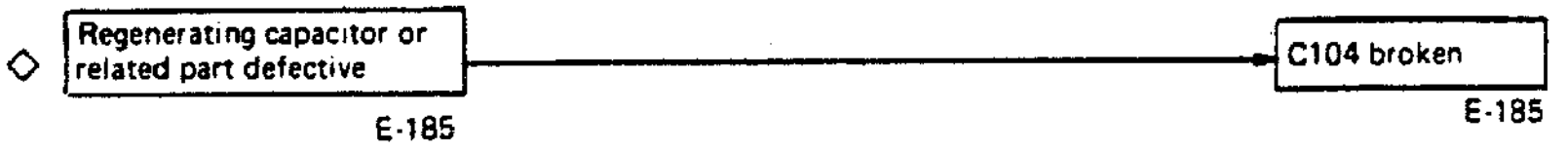
(1) Shutter speed too high in both AUTO and MANUAL modes



(2) Shutter speed too high in AUTO mode only

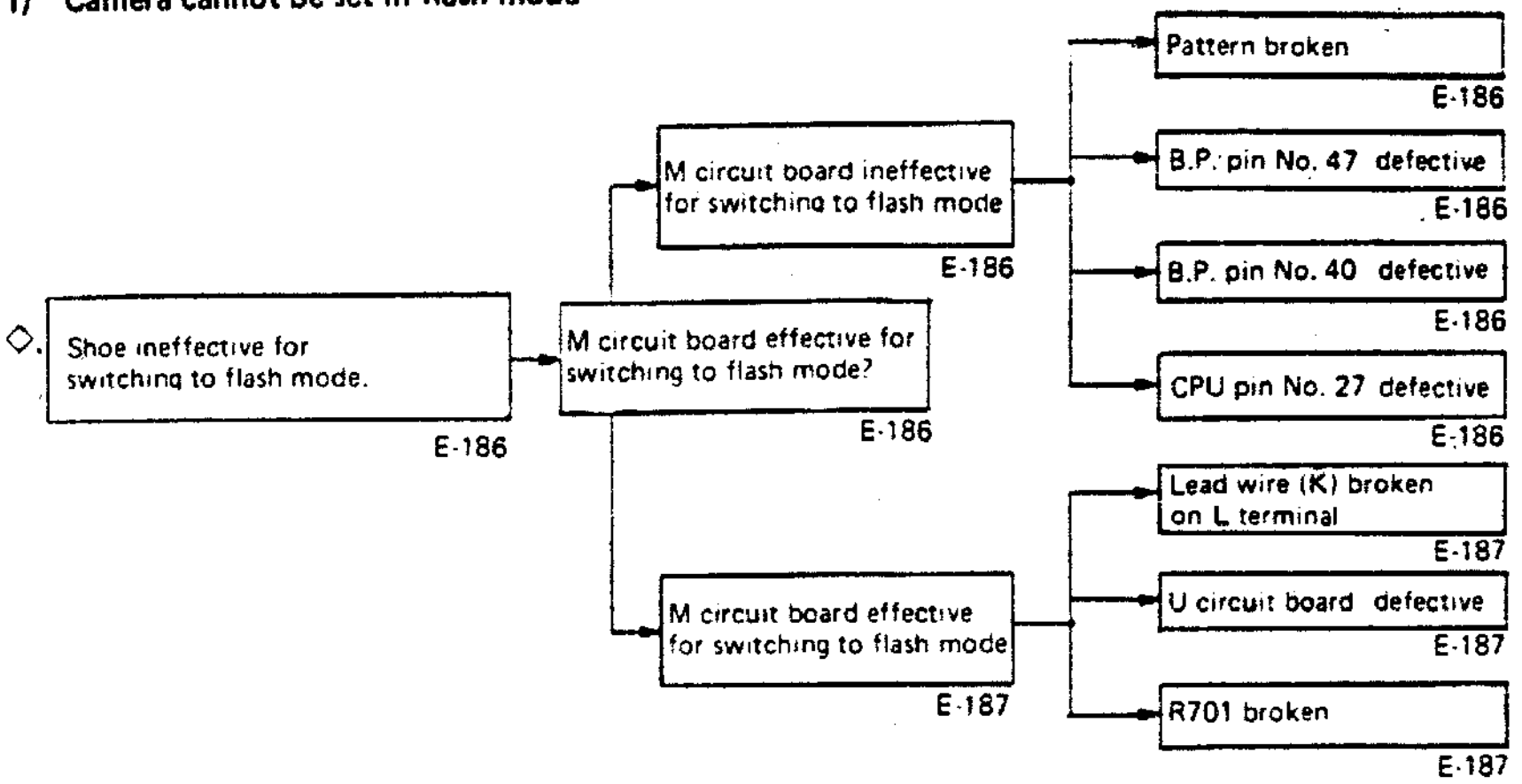


(3) Shutter speed too high in MANUAL mode only



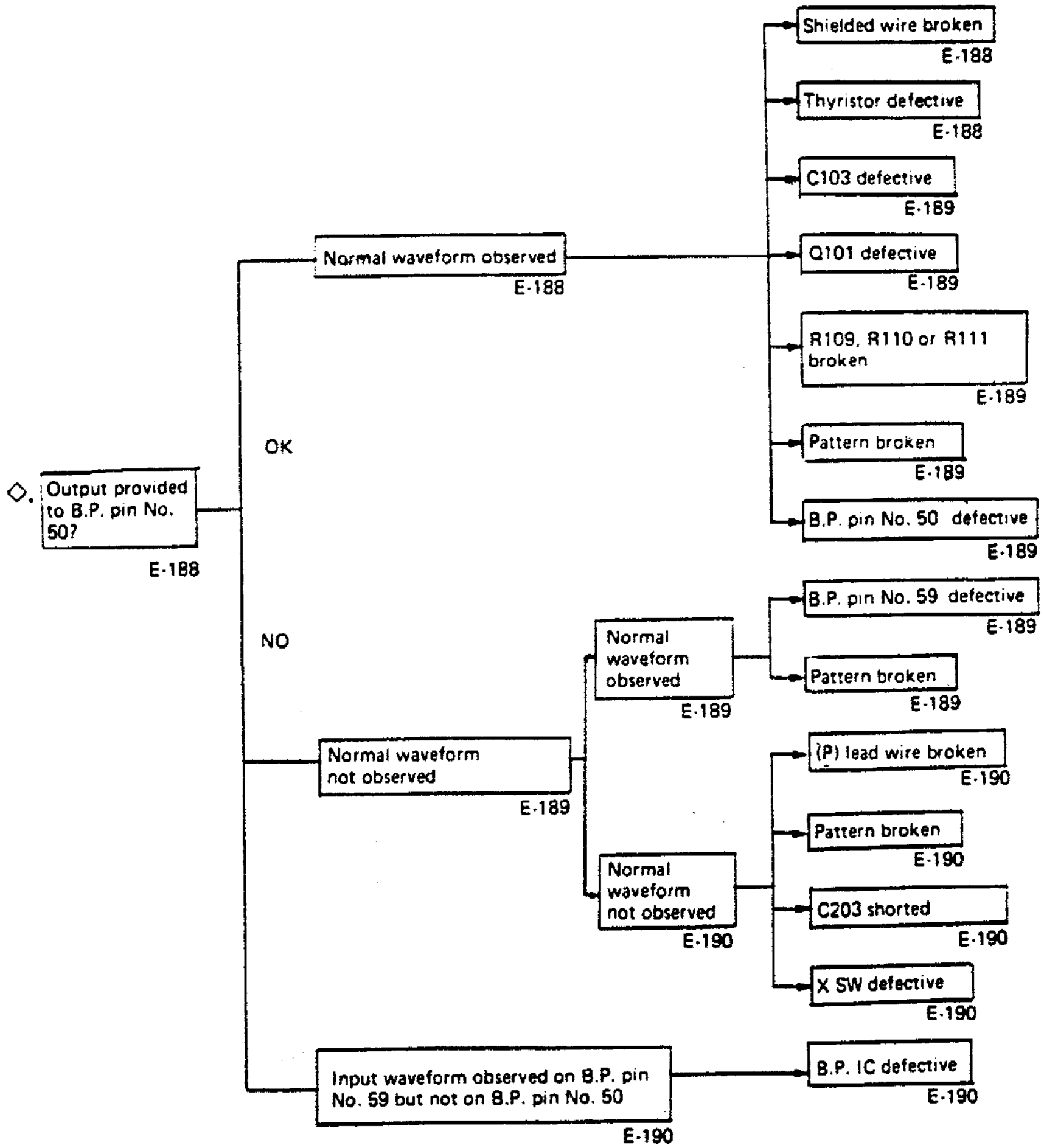
2-6. Flash Circuit Defective

(1) Camera cannot be set in flash mode

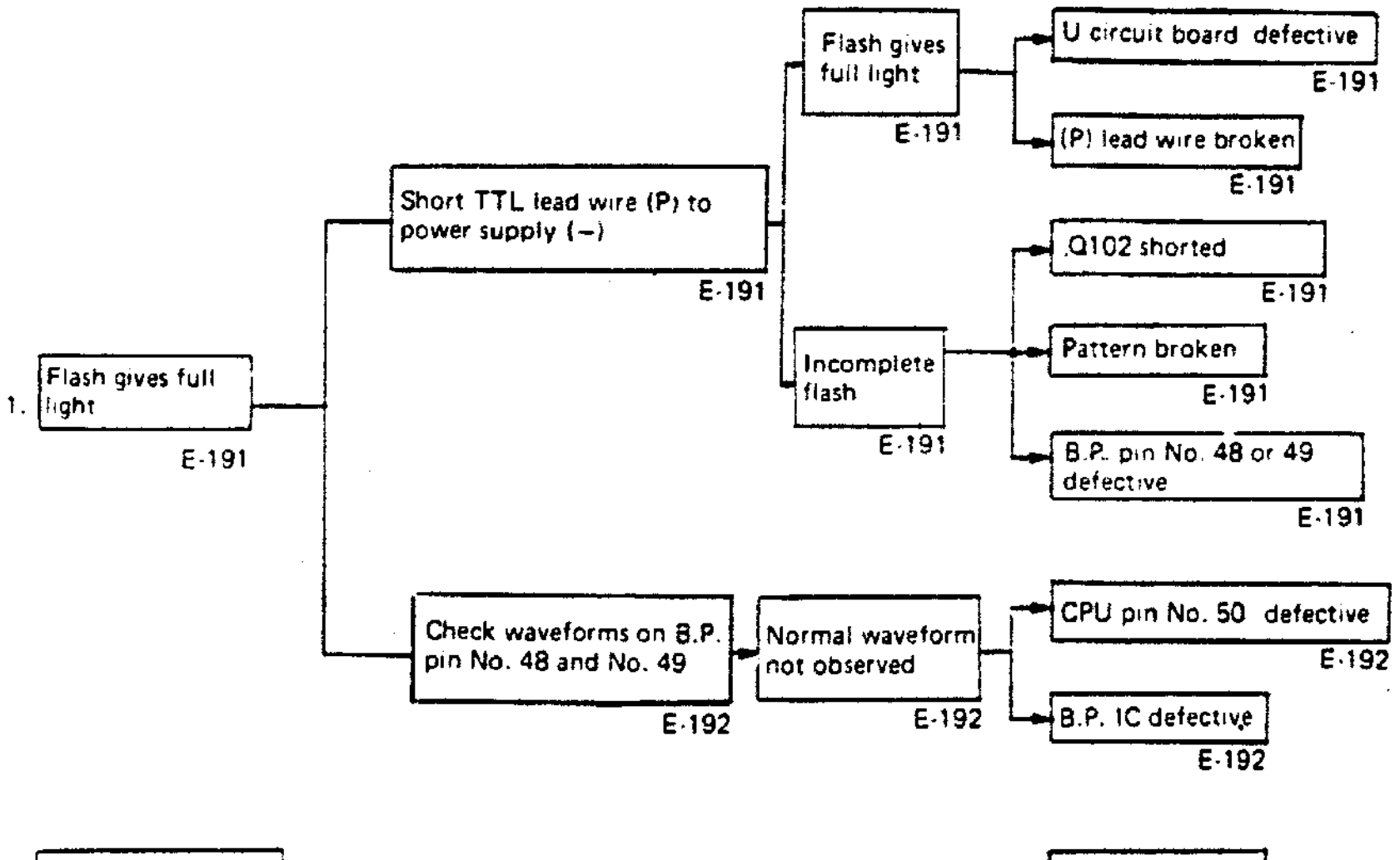


(2) Charging completion LED not light

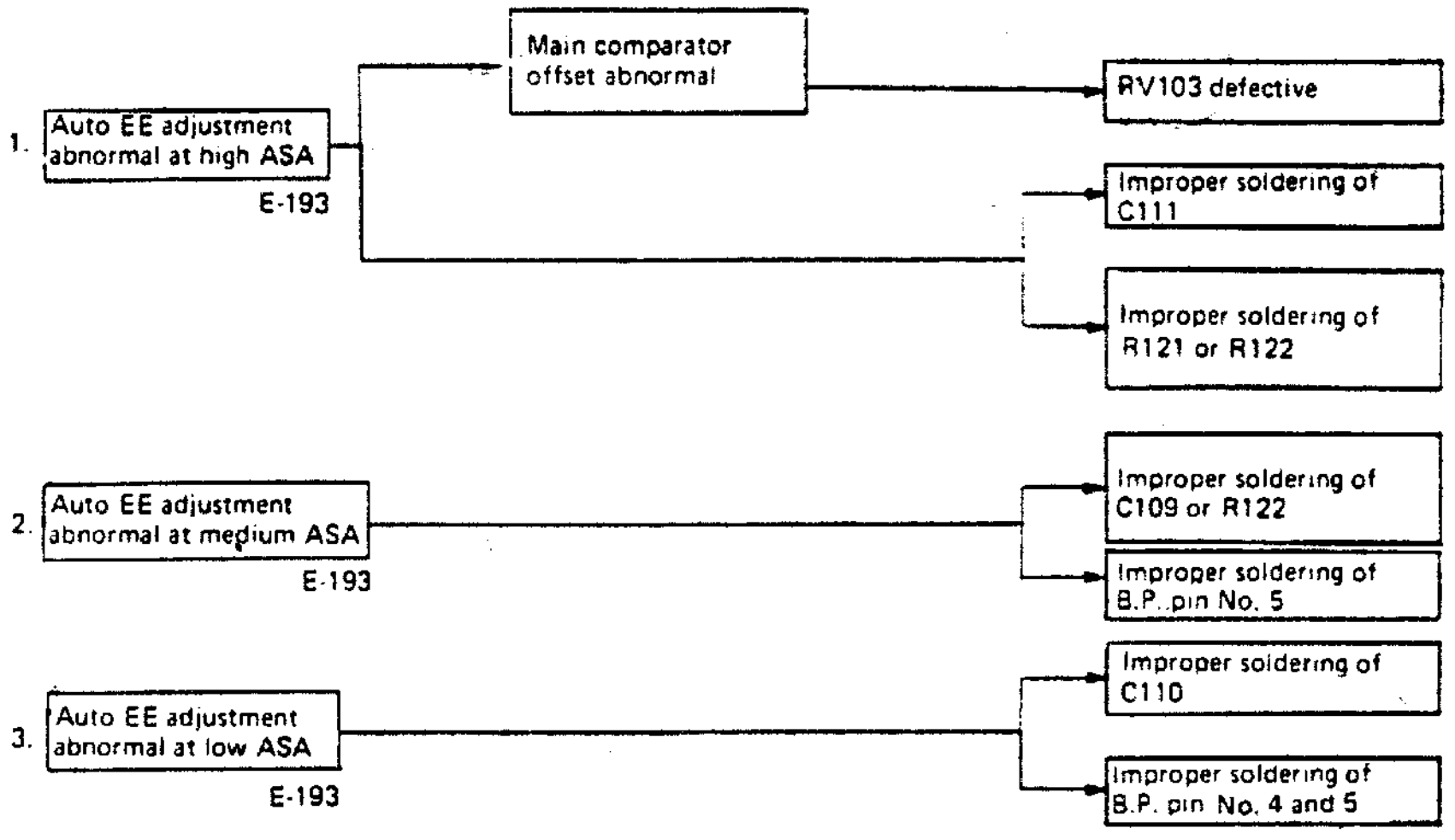
(3) Strobe not flash



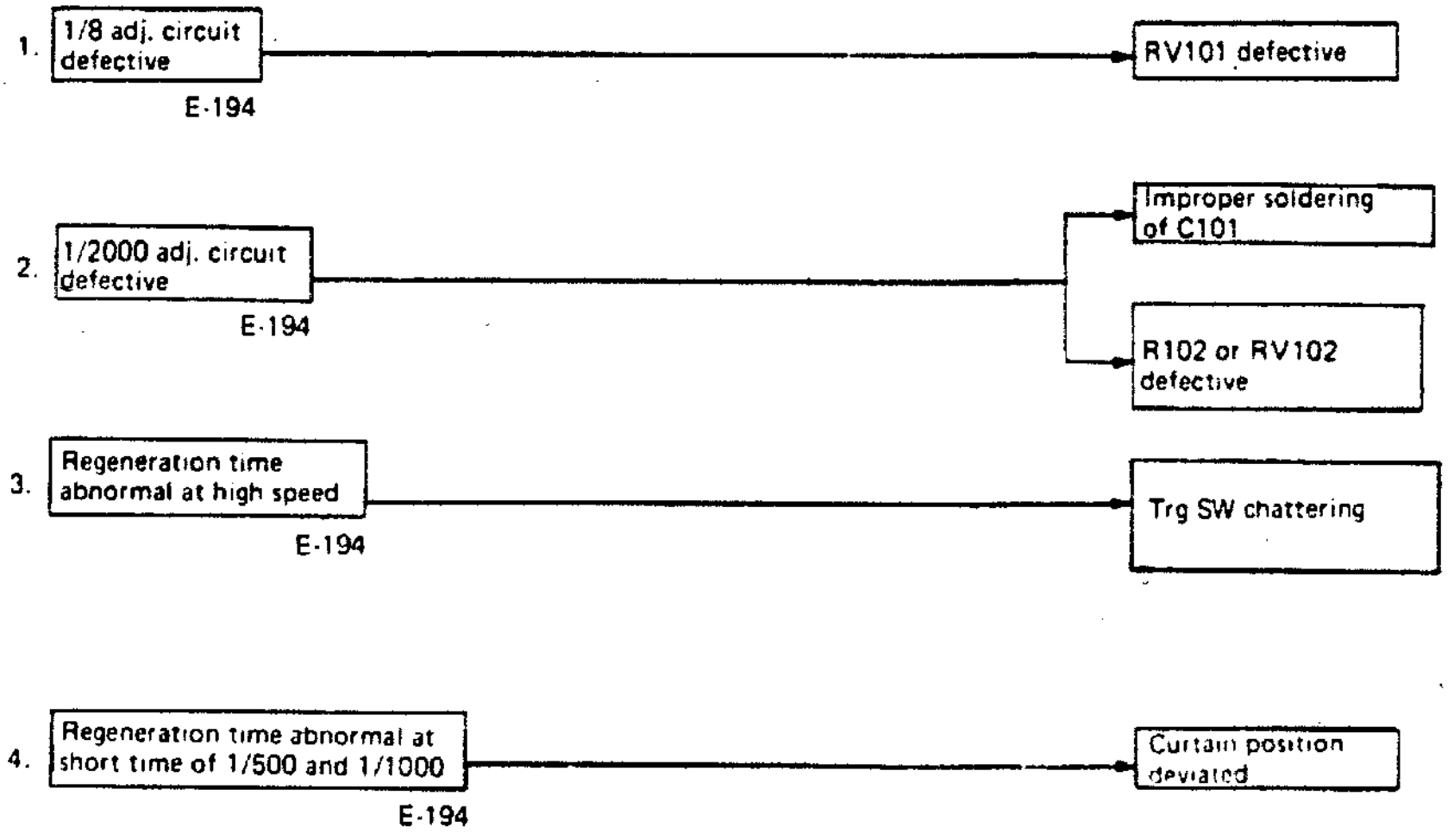
(4) Light control impossible



2-7. Auto EE Adjustment Abnormal

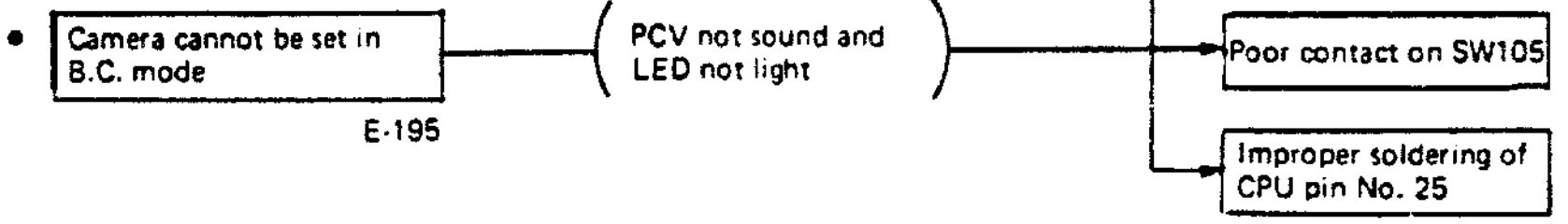

1. Auto EE adjustment abnormal at high ASA
E-193
Main comparator offset abnormal
RV103 defective
Improper soldering of C111
Improper soldering of R121 or R122
2. Auto EE adjustment abnormal at medium ASA
E-193
Improper soldering of C109 or R122
Improper soldering of B.P. pin No. 5
3. Auto EE adjustment abnormal at low ASA
E-193
Improper soldering of C110
Improper soldering of B.P. pin No. 4 and 5
6. Auto EE adjustment abnormal at high brightness
E-193
• ASA100
RV103 defective
Improper soldering of R122
5. Auto EE adjustment at low brightness
E-193
• ASA100
Improper soldering of C109
4. Auto EE adjustment abnormal at any brightness
E-193
Main SW chattering
Improper soldering of C112
RV110 defective

2-8. Regeneration Time Abnormal



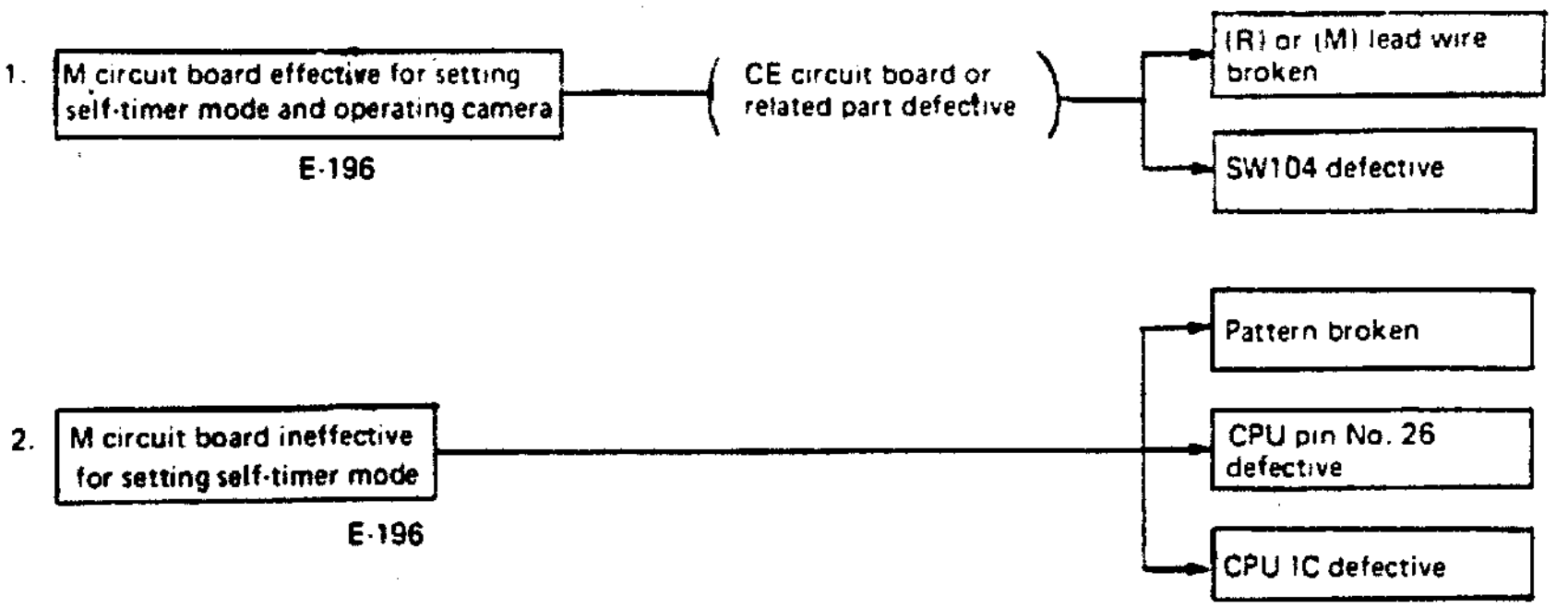
2-9. Malfunction of B.C. System

- For the LED and PCV, refer to the concerned items.

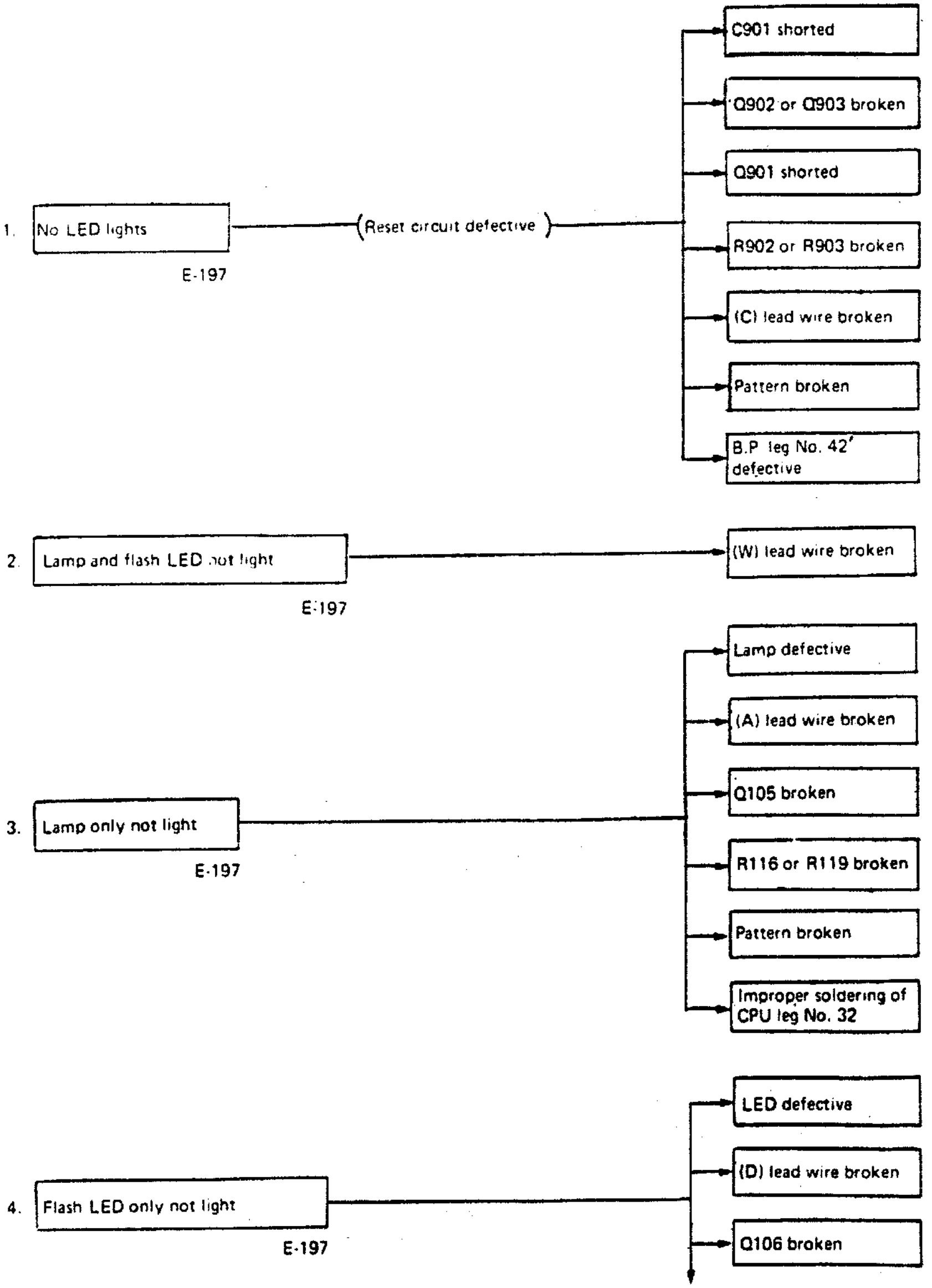

Camera cannot be set in B.C. mode
E-195
PCV not sound and LED not light
(W) lead wire broken
Poor contact on SW105
Improper soldering of CPU pin No. 25

2-10. Self-Timer Inoperative

- For the LED and PCV, refer to the concerned items.


1.
M circuit board effective for setting self-timer mode and operating camera
E-196
CE circuit board or related part defective
(R) or (M) lead wire broken
SW104 defective
2.
M circuit board ineffective for setting self-timer mode
E-196
Pattern broken
CPU pin No. 26 defective
CPU IC defective

2-11. LED Abnormal



4. Flash LED only not light
E-197

- Pattern broken — E-197
- R115 broken — E-197
- Improper soldering of CPU pin No. 33 — E-197

5. Both B.C. and SELF LEDs not light
E-198

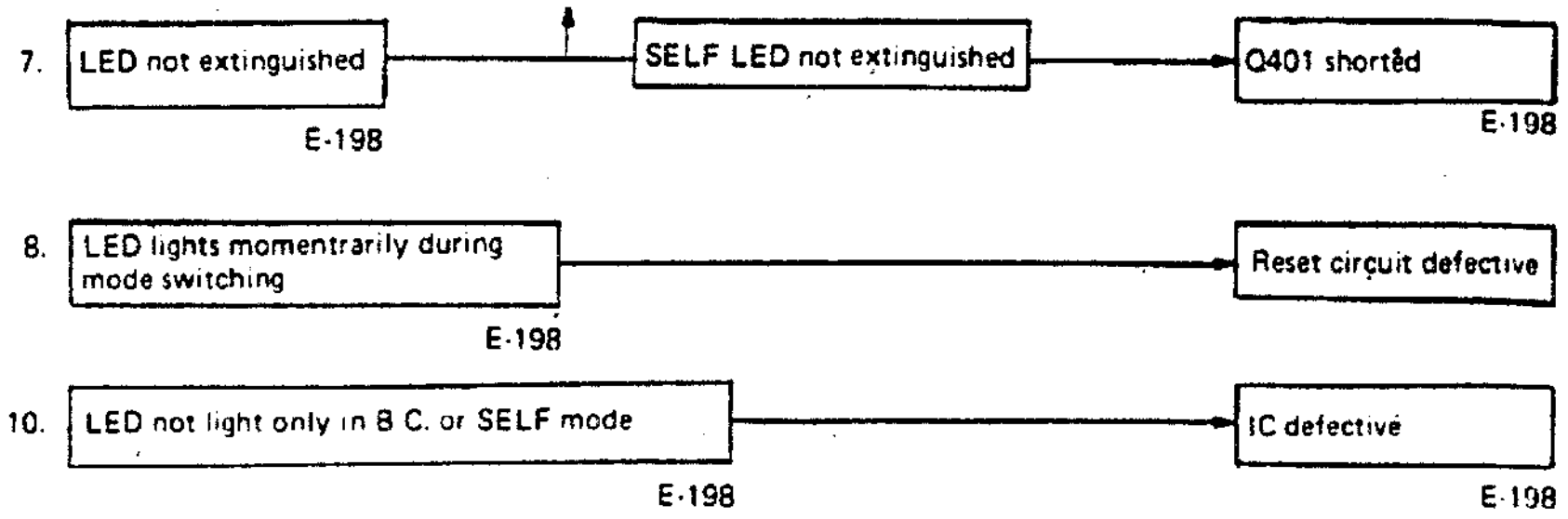
- (W) lead wire broken — E-198
- (A) lead wire broken — E-198
- R112 or R401 broken — E-198
- (B) lead wire broken — E-198
- Improper soldering of B.P. pin No. 41 — E-198
- LED defective — E-198

6. MEMO LED only not light
E-198

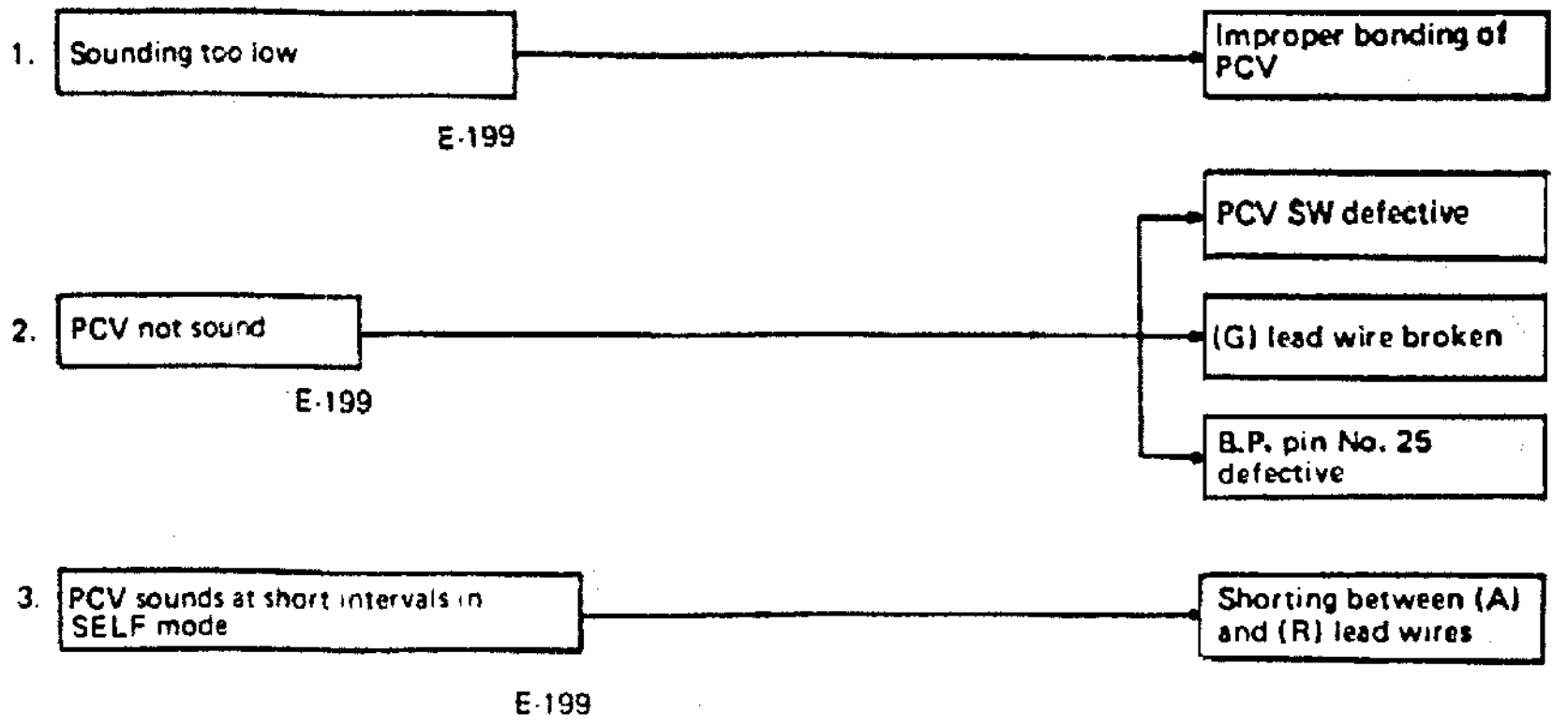
- U circuit board defective — E-198
- (W) lead wire broken — E-198
- R117 broken — E-198
- Pattern broken — E-198
- Improper soldering of CPU leg No. 31 — E-198
- LED defective — E-198

7. LED not extinguished
E-198

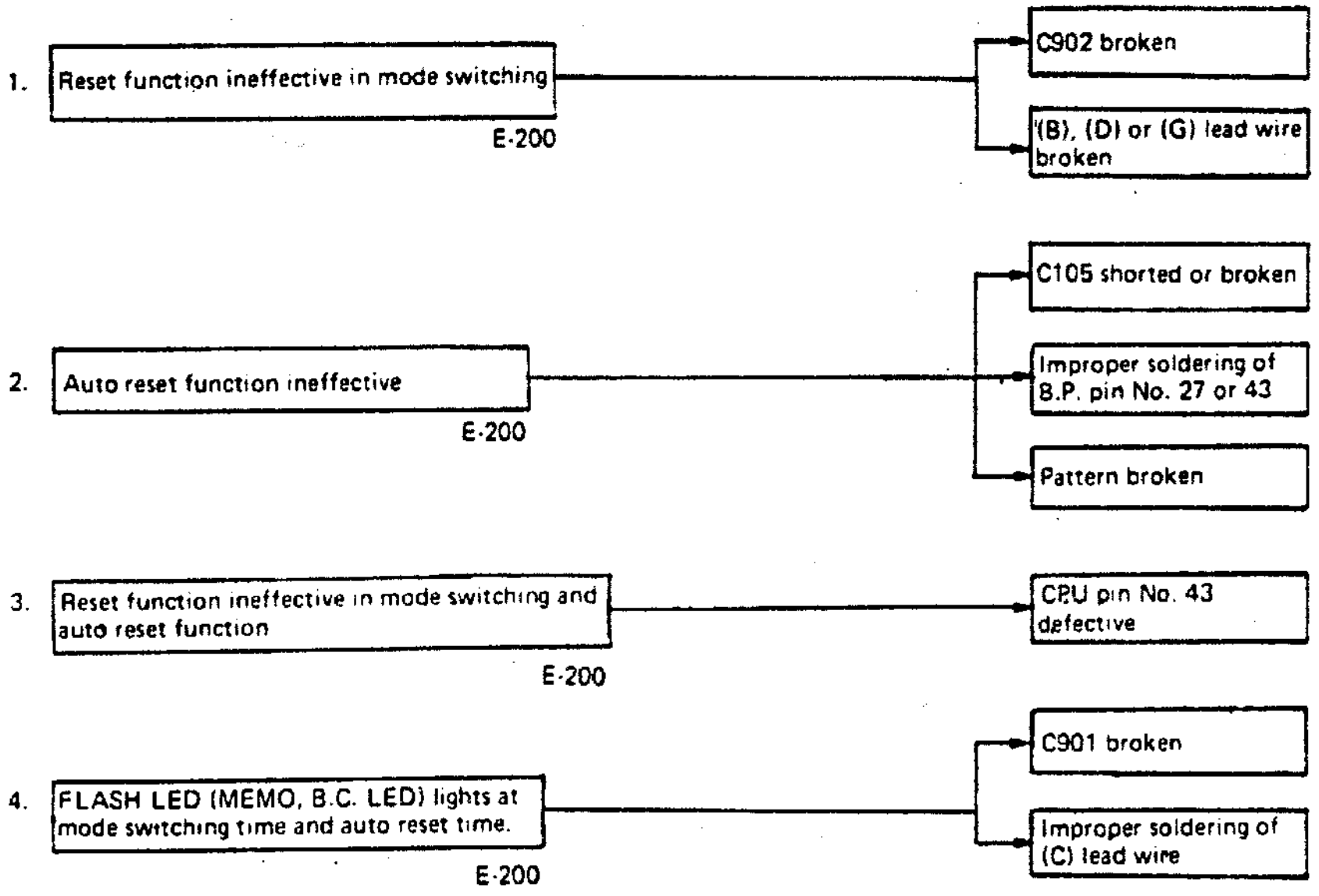
- MEMO LED not extinguished — E-198
  - Q104 shorted — E-198
- LAMP LED not extinguished — E-198
  - Q105 shorted — E-198
- FLASH LED not extinguished — E-198
  - Q106 shorted — E-198


7.
LED not extinguished
E-198
SELF LED not extinguished
Q401 shorted
E-198
8.
LED lights momentrarily during mode switching
E-198
Reset circuit defective
10.
LED not light only in B C. or SELF mode
E-198
IC defective
E-198

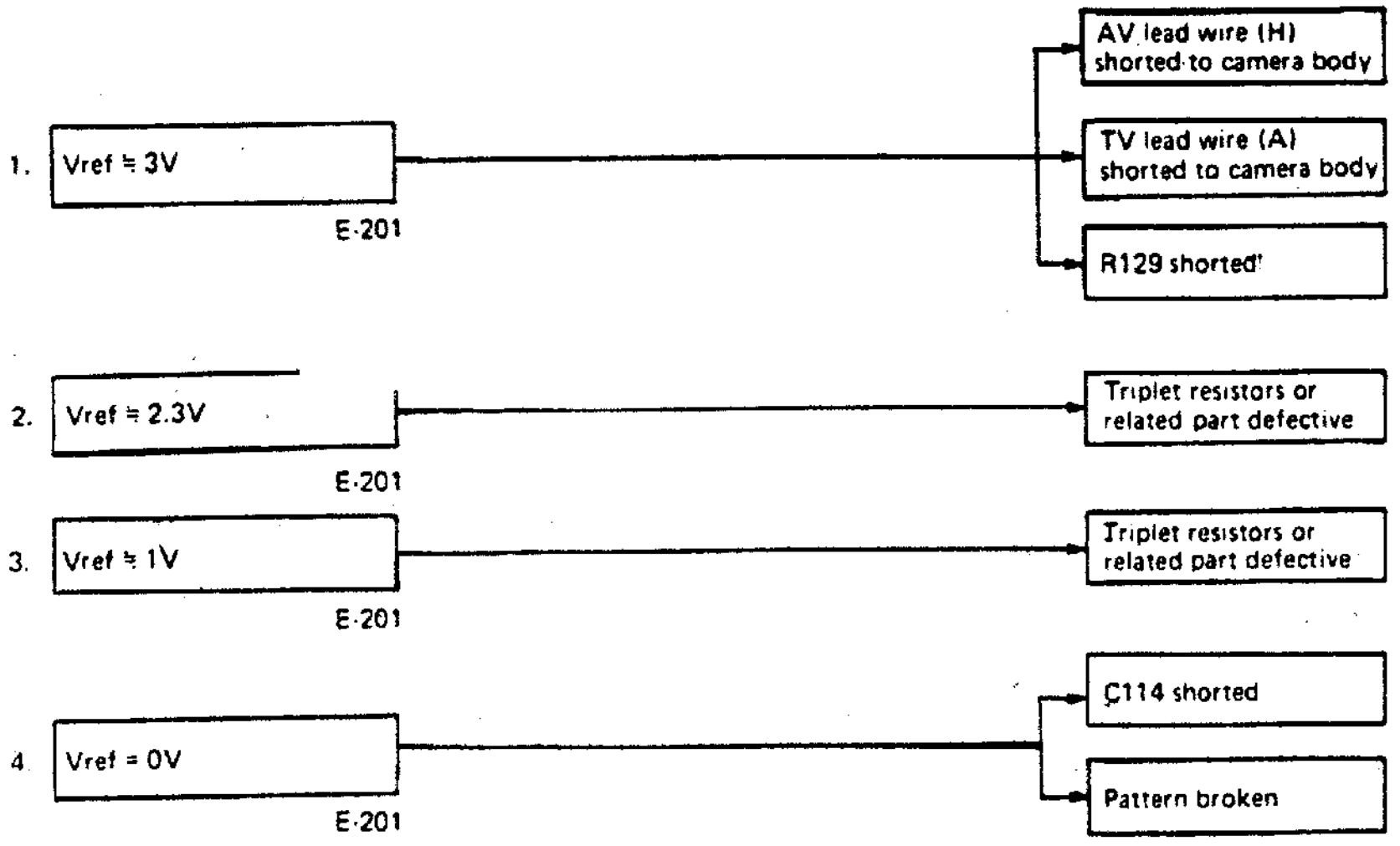
2-12. PCV Defective



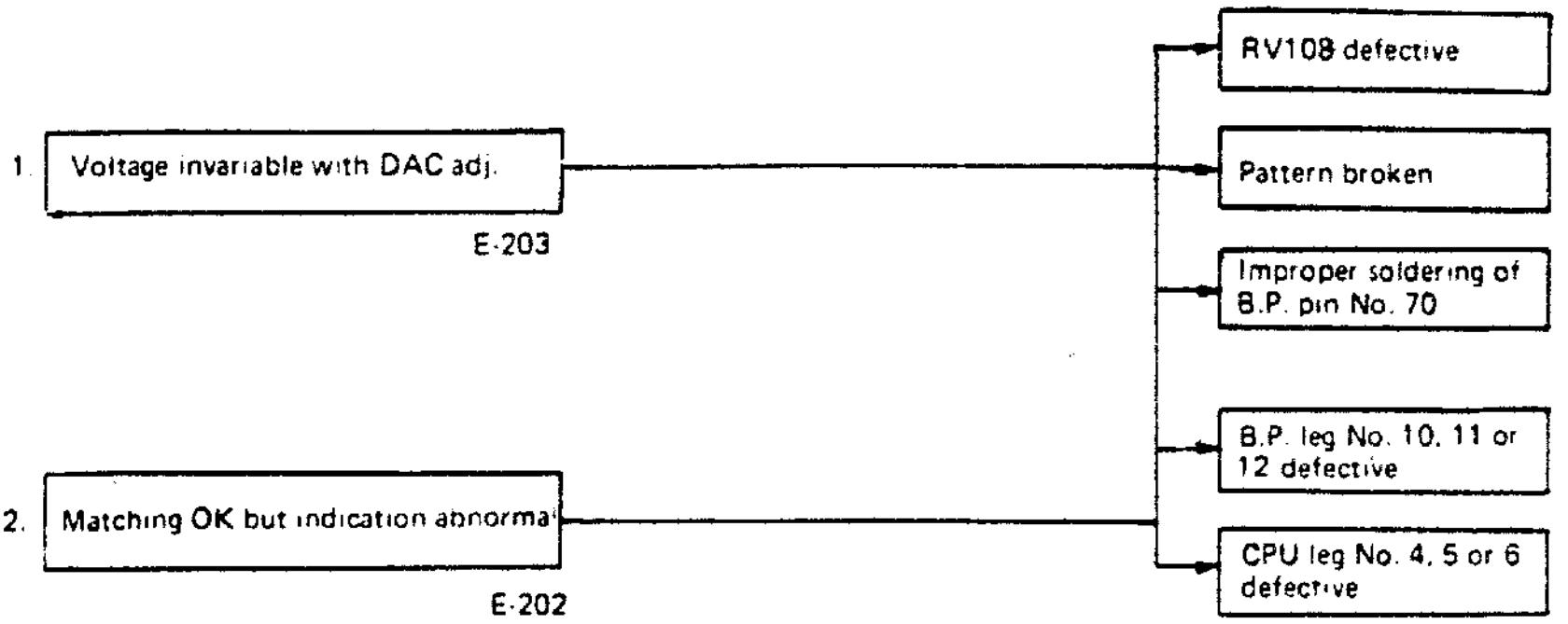
2-13. Reset Function Abnormal


1.
Reset function ineffective in mode switching
E-200
C902 broken
(B), (D) or (G) lead wire broken
2.
Auto reset function ineffective
E-200
C105 shorted or broken
Improper soldering of B.P. pin No. 27 or 43
Pattern broken
3.
Reset function ineffective in mode switching and auto reset function
E-200
CPU pin No. 43 defective
4.
FLASH LED (MEMO, B.C. LED) lights at mode switching time and auto reset time.
E-200
C901 broken
Improper soldering of (C) lead wire

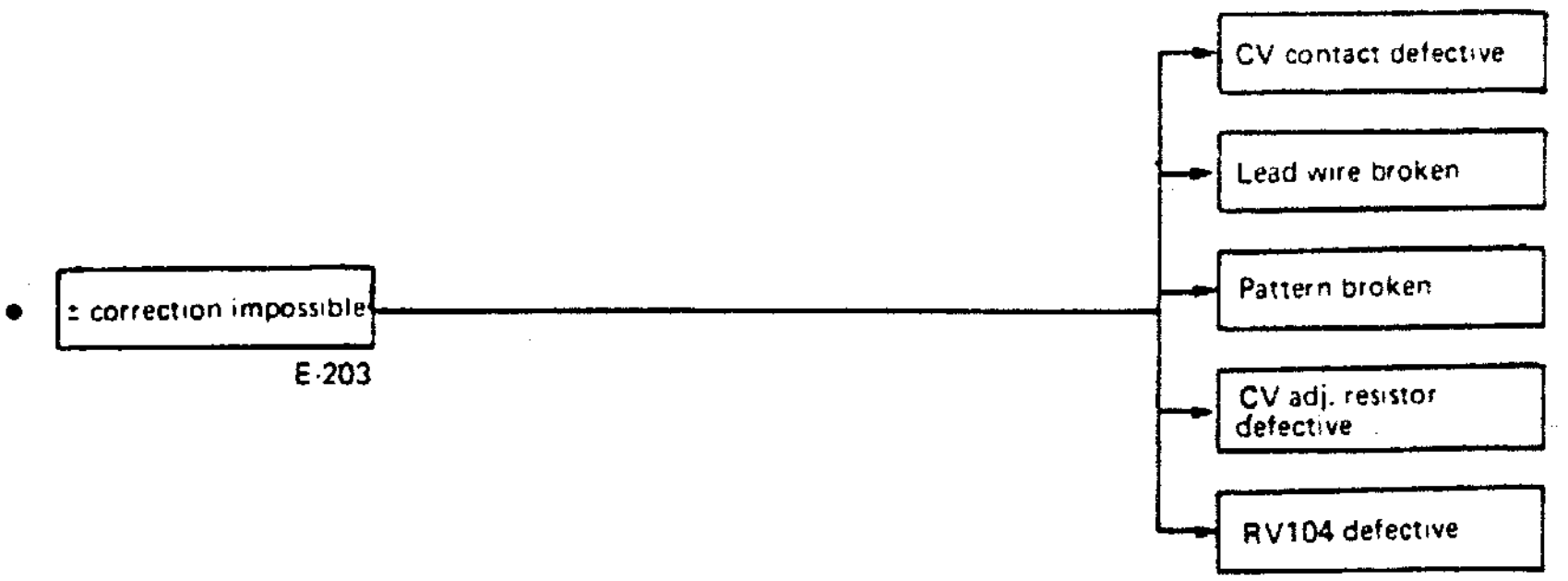
2-14. Reference Voltage Vref Abnormal



2-15. DAC Adjusting Circuit Defective


1. Voltage invariable with DAC adj.
E-203
2. Matching OK but indication abnormal
E-202
RV108 defective
Pattern broken
Improper soldering of B.P. pin No. 70
B.P. leg No. 10, 11 or 12 defective
CPU leg No. 4, 5 or 6 defective

2-16. Correction Adjustment Abnormal



3. Troubleshooting: Check Procedures

3-1. Electric System Dead

- LCD and LED indicators are inoperative in B. CHECK, AUTO and MANUAL modes.
- Troubleshooting is given on a premise that the mechanical system operates normally.

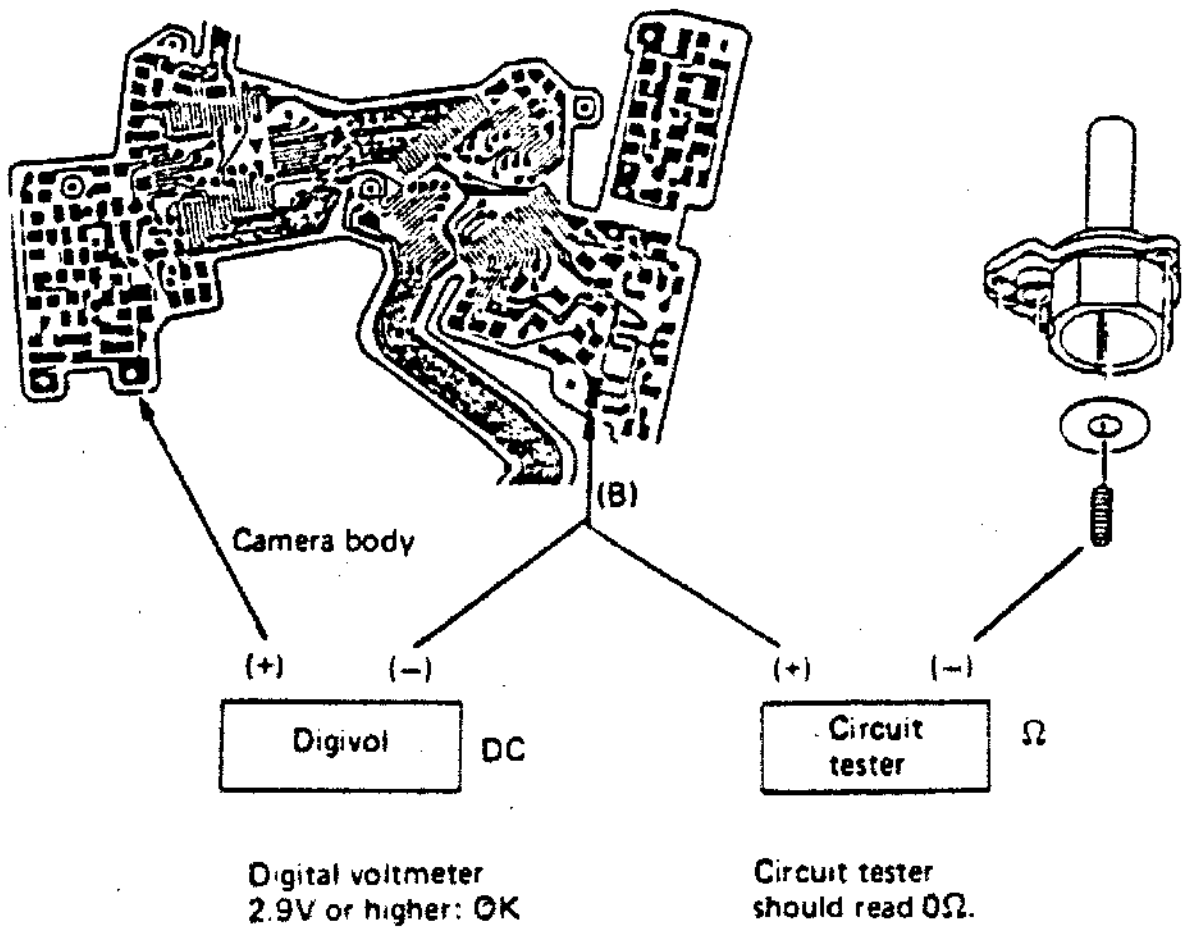
- Preparations
  1. Measuring instruments: Digital voltmeter or circuit tester
     Synchroscope
  2. Mode: B.C. mode unless other wise specified.
     When the camera is inoperative in the B.C. mode, attach the lens and check the camera in the AUTO or MANUAL mode.

1. Power supplied to circuit board?

- Power supply voltage 2.90 V or higher: OK
- When power supply voltage is lower than 2.65 V.

(1) Check battery capacity.

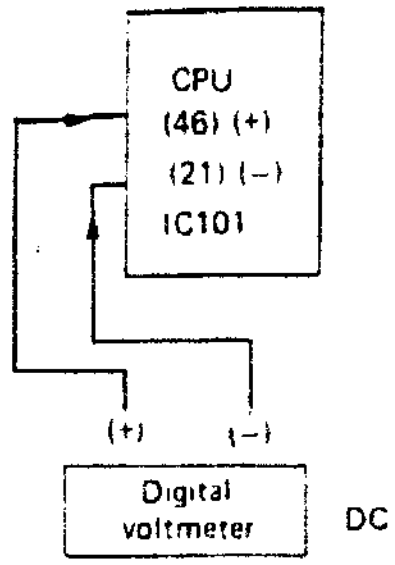
(2) Check power supply (–) lead wire for breakage.



Digital voltmeter
2.9V or higher: OK

Circuit tester
should read 0Ω.

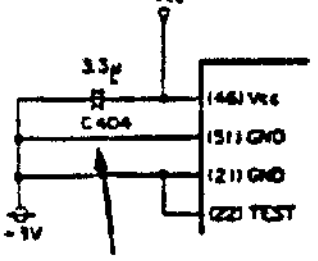
2. Power supplied to CPU?



- 2.90 V or higher: OK

- When voltage is lower than 2.65 V

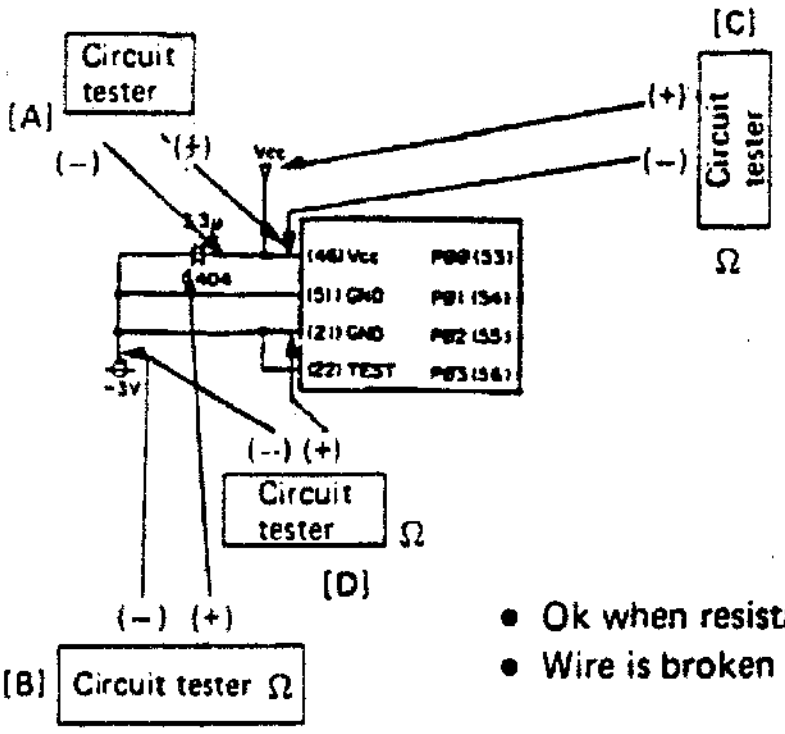
(1) C404 shorted



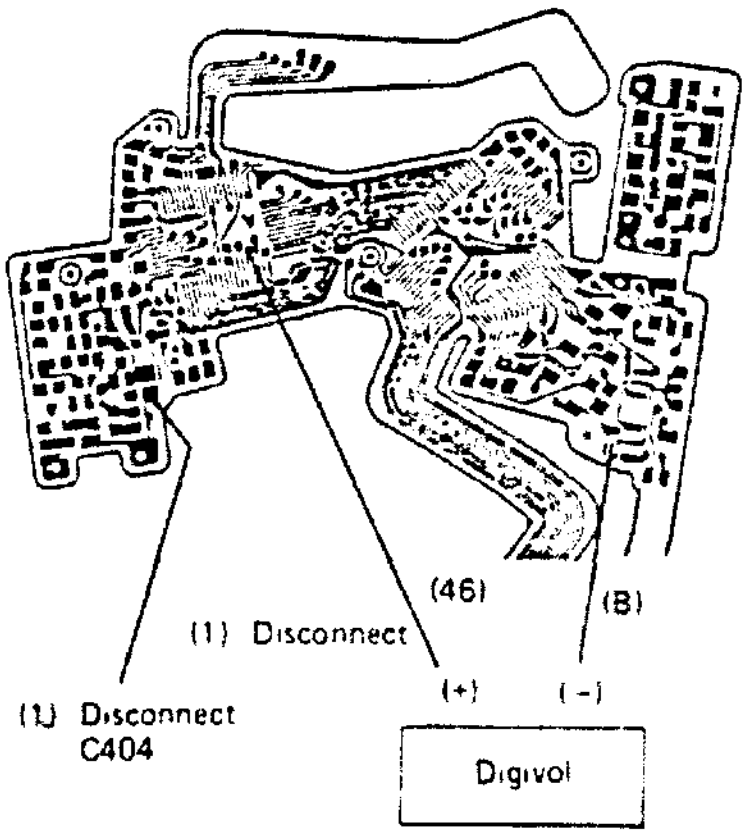
Disconnect

C404 is defective when the camera is operative after disconnecting the capacitor.

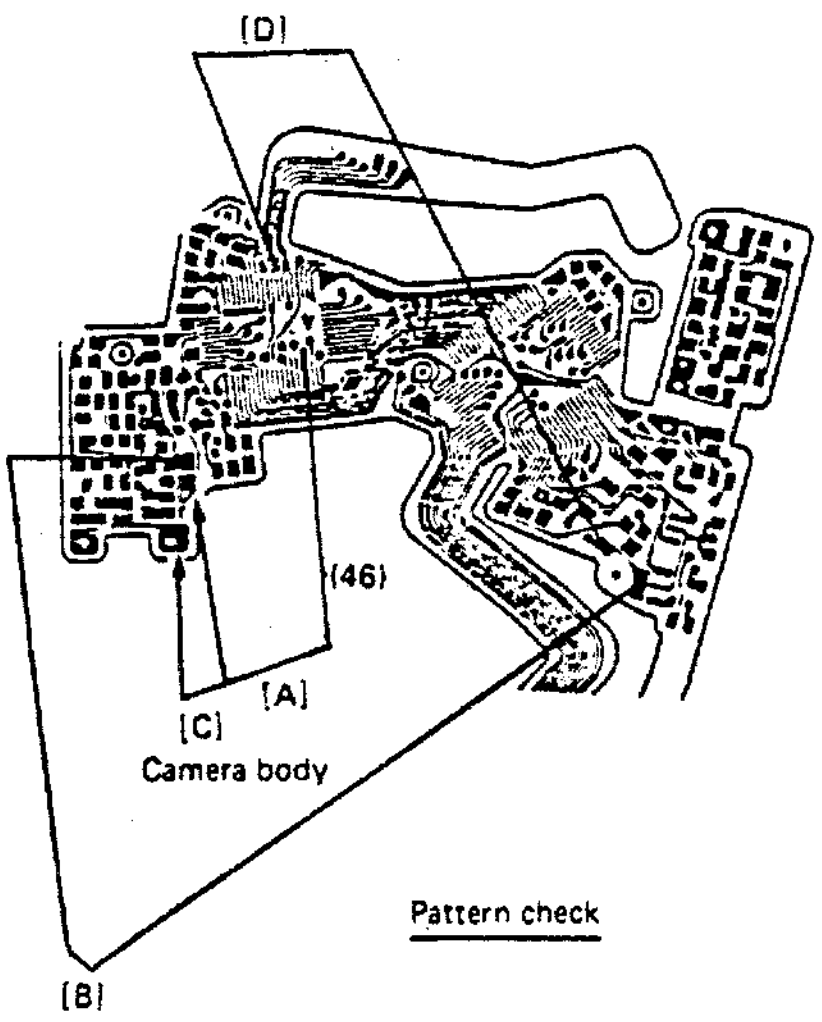
(2) Pattern broken



7. Checks of voltage and C404



2.90V or higher: OK

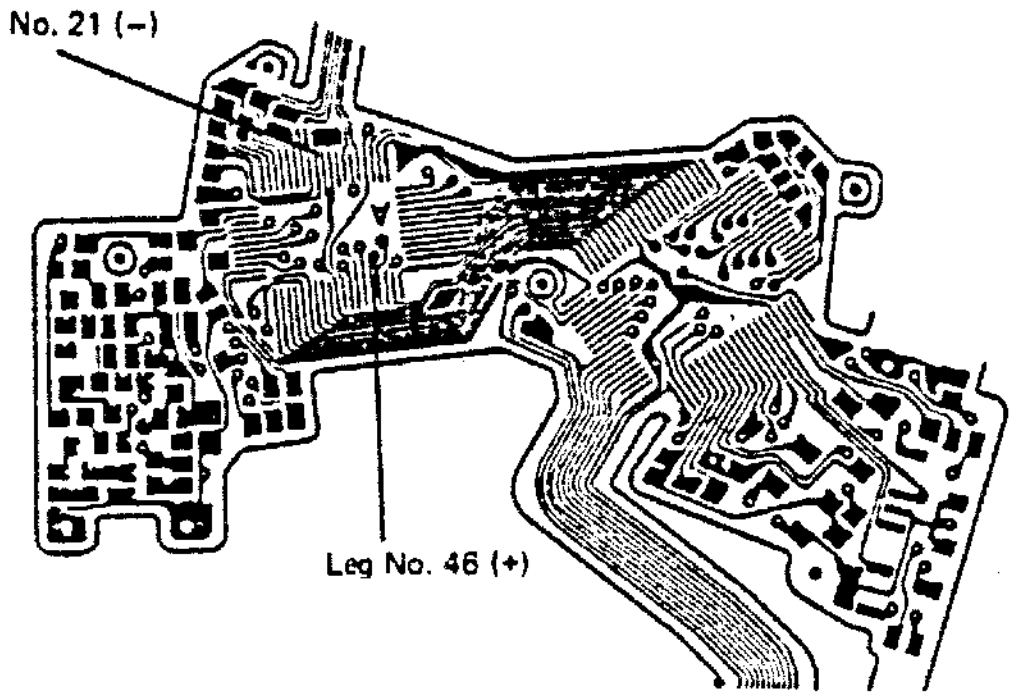


Pattern check

- Ok when resistance is 0Ω at each check point.
- Wire is broken when resistance exceeds acores of ohms.

(3) Check of CPU legs Nos. 1 and 46.

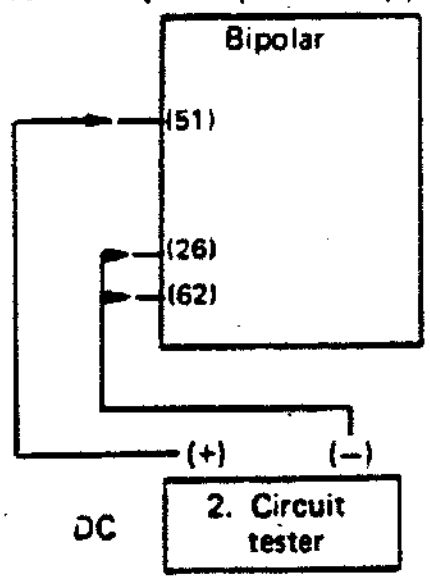
○ Resolder

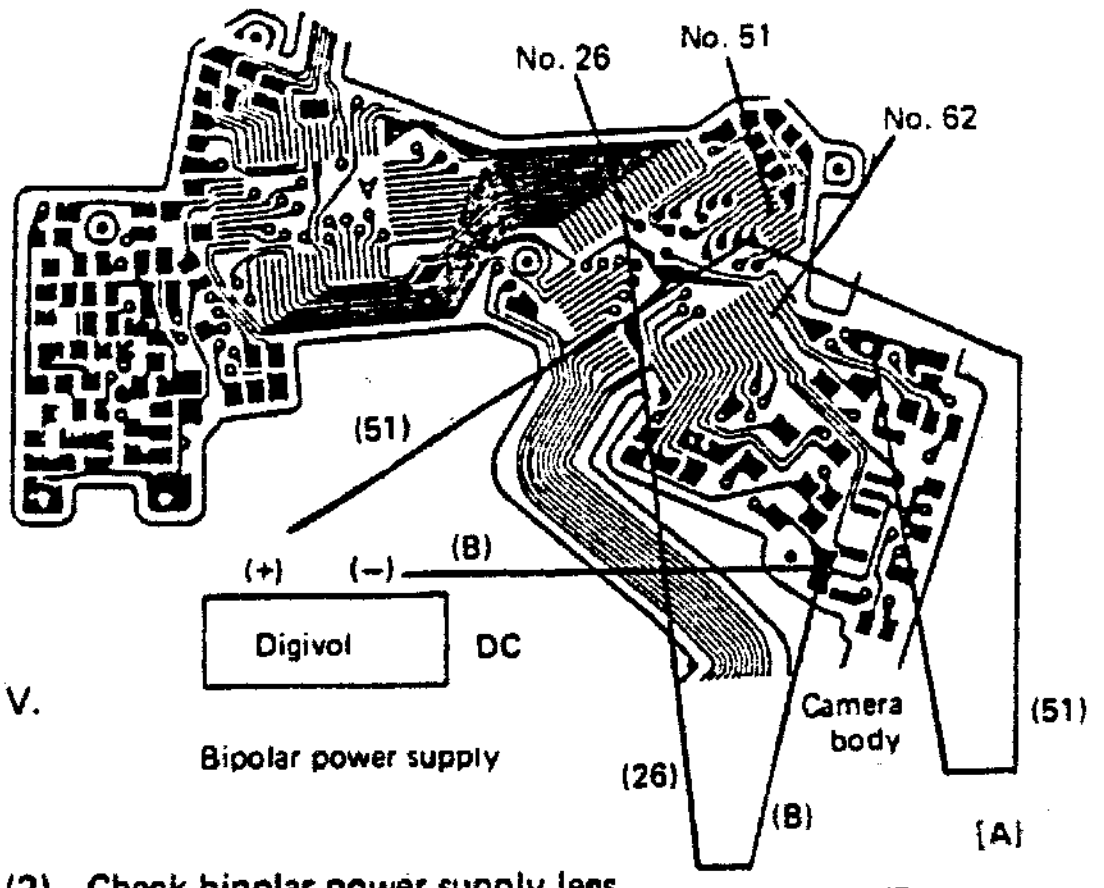


3. Bipolar power supplied?

Vref 1.8V: OK

- Check of bipolar power supply.

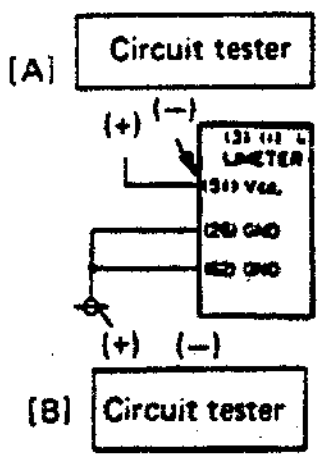




- 2.90 V or higher: OK
- When voltage is lower than 2.65 V.

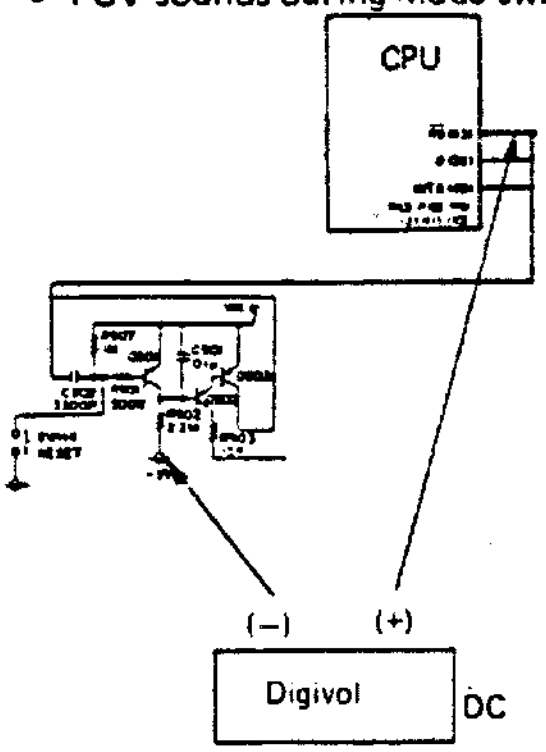
(1) Pattern broken----

(2) Check bipolar power supply legs No. 26, No. 51 and No. 62 for soldering.
Resolder



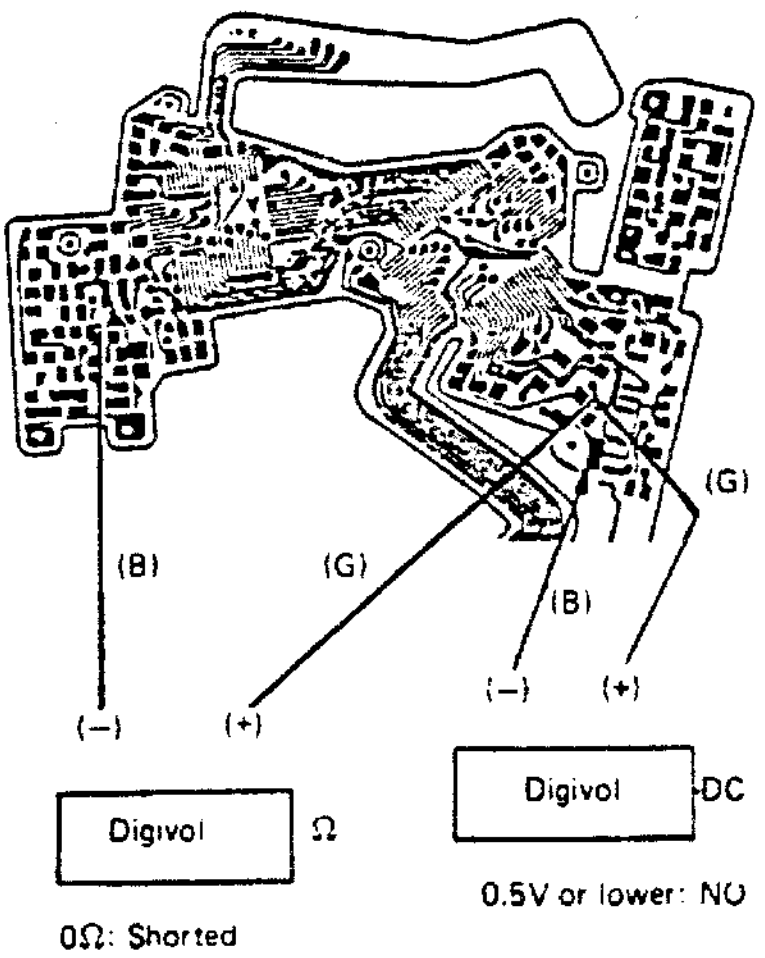
4. Power supplied to reset circuit?

- PCV sounds during mode switching



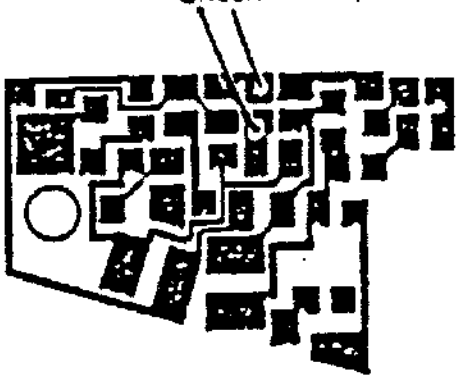
- OK when voltage is higher than 0.5 V.
- When voltage is lower than 0.5 V.

(1) Reset circuit defective
Improper soldering of B.P. leg No. 26, 51 or 62.

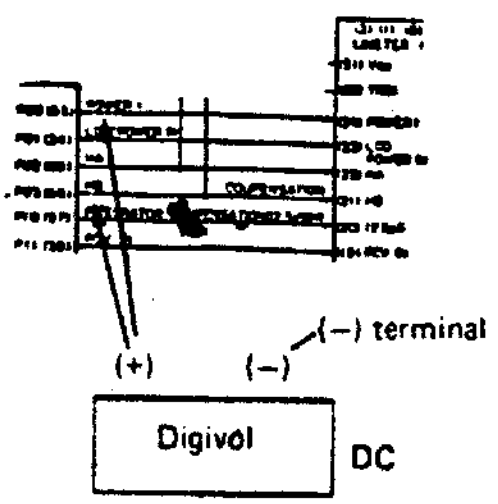


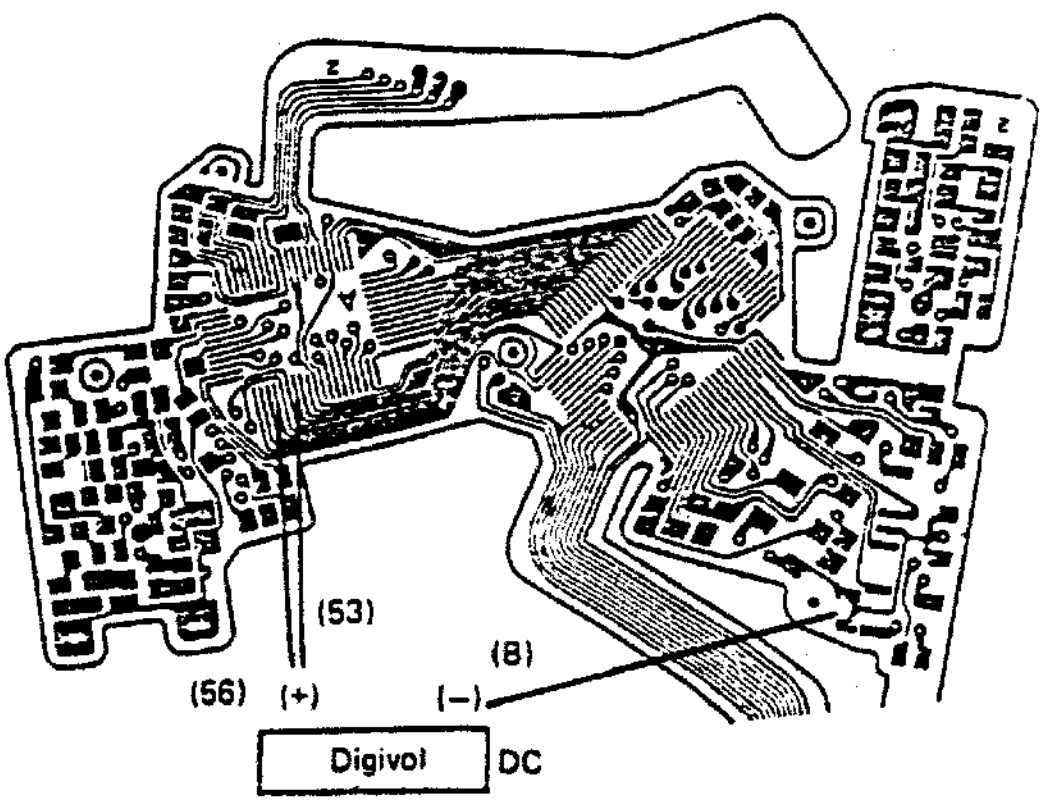
Check these parts for shorting.

(2) (−) side of C902 shorted to (−) power supply.



5. CPU POWER, HB output provided?





• DC voltage at 3 V: OK

• When DC voltage is 0 V.

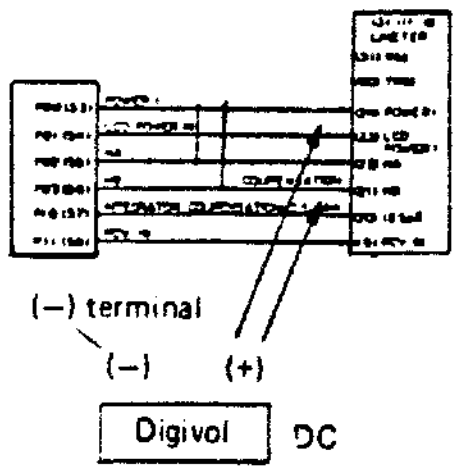
(1) Improper soldering of CPU leg No. 53 or 56.

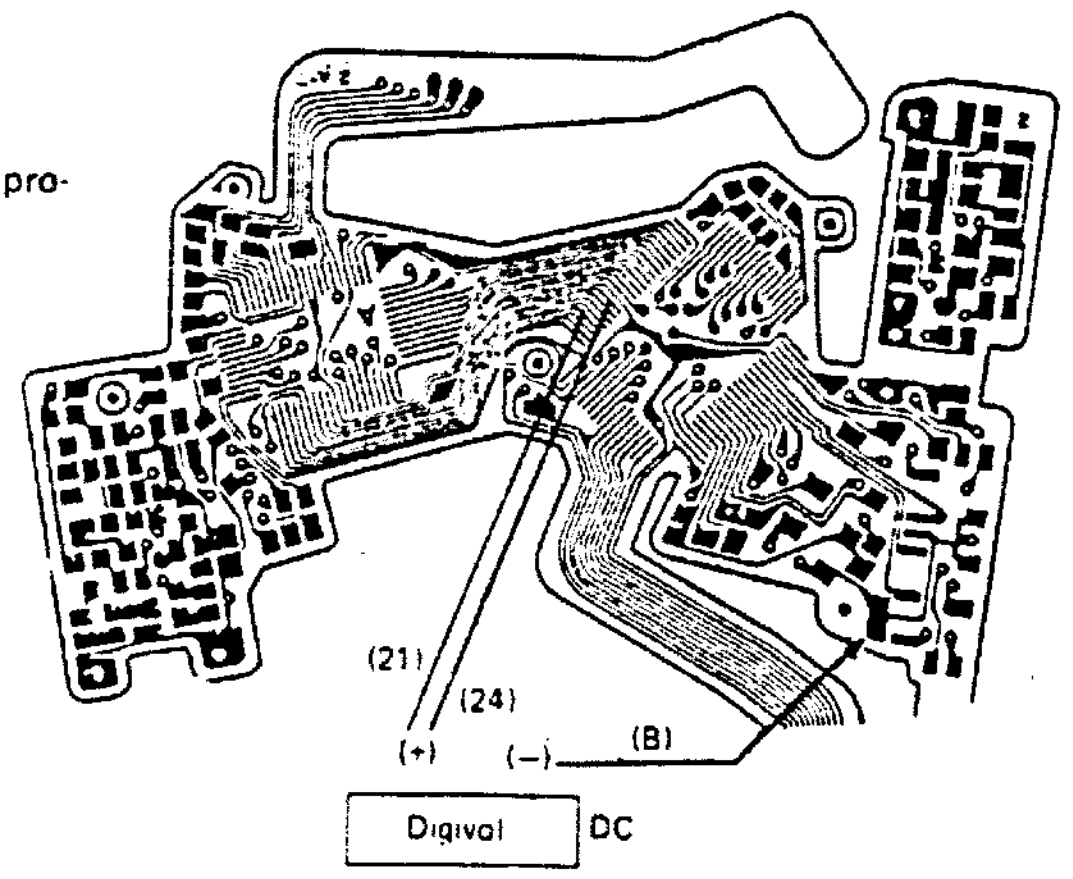
• When output is not provided after resoldering. (2)→ CPU IC defective

Bipolar power supply

6. **Check POWER, HB input.**

• Check the input when output is provided from CPU.





• HA and HB supplied?

When DC voltage is 3 V: OK

• When DC voltage is 0 V.

(1) Check IC No 21 and No. 24 for soldering.

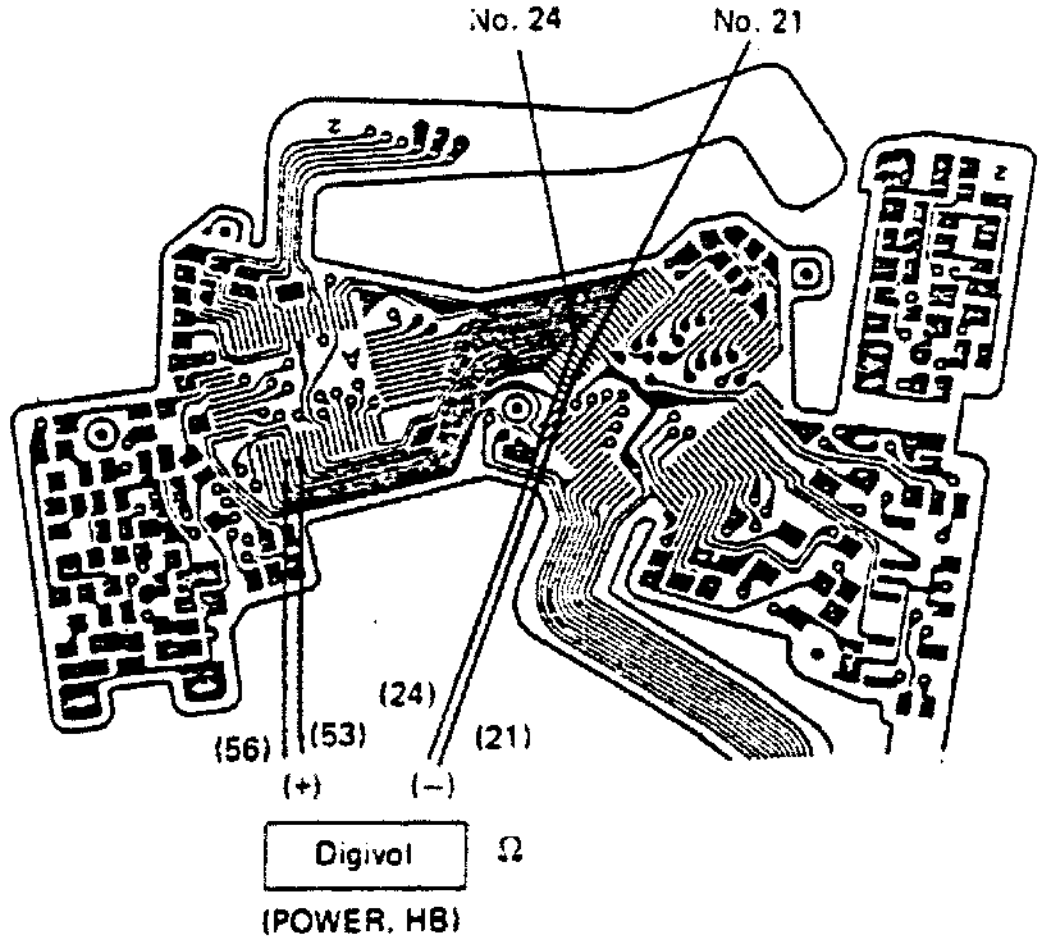
(2) Check pattern for breakge.

○ 0Ω : OK

○ Wire broken when resistance exceeds some scores of ohms.

○ Check HB across No. 56 and No. 21.

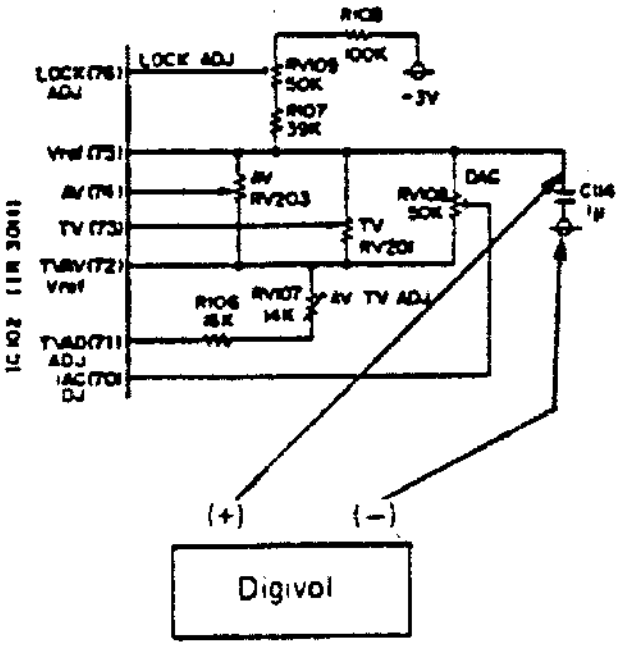
○ Check power across No. 53 and No. 24.

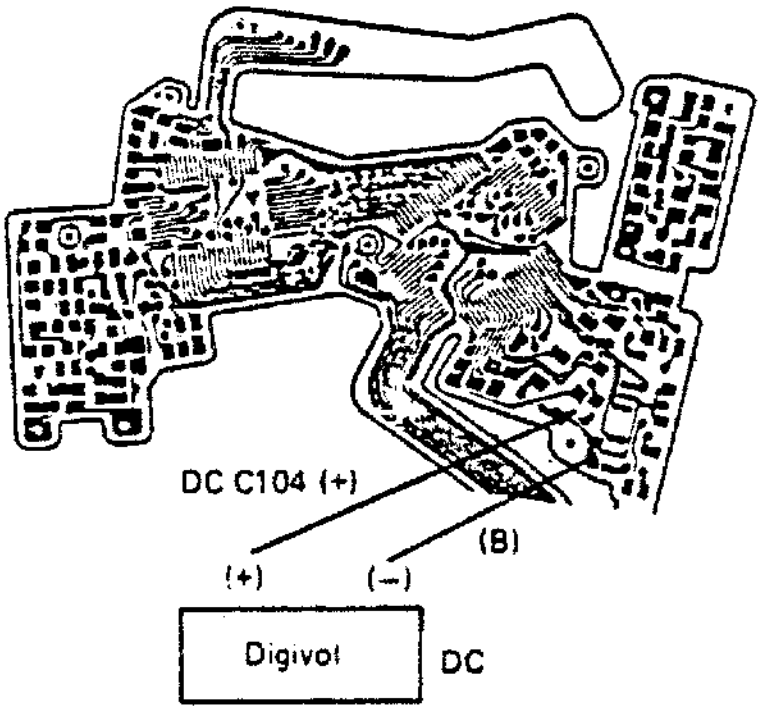


(POWER, HB)

7. Vref 1.8 V outputted?

- Check Vref when POWER and HB are inputted.

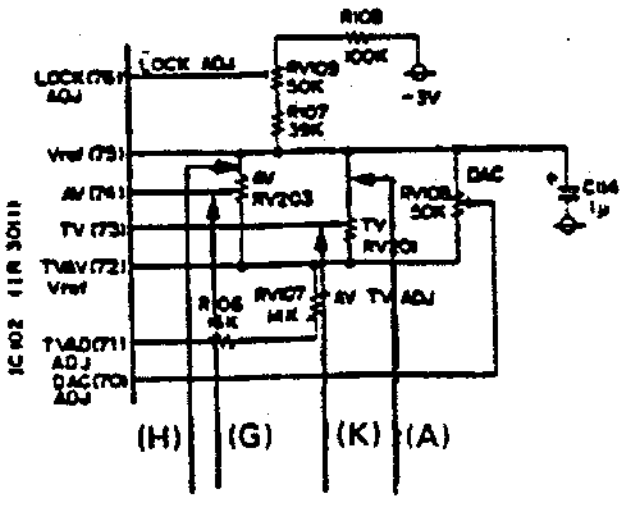




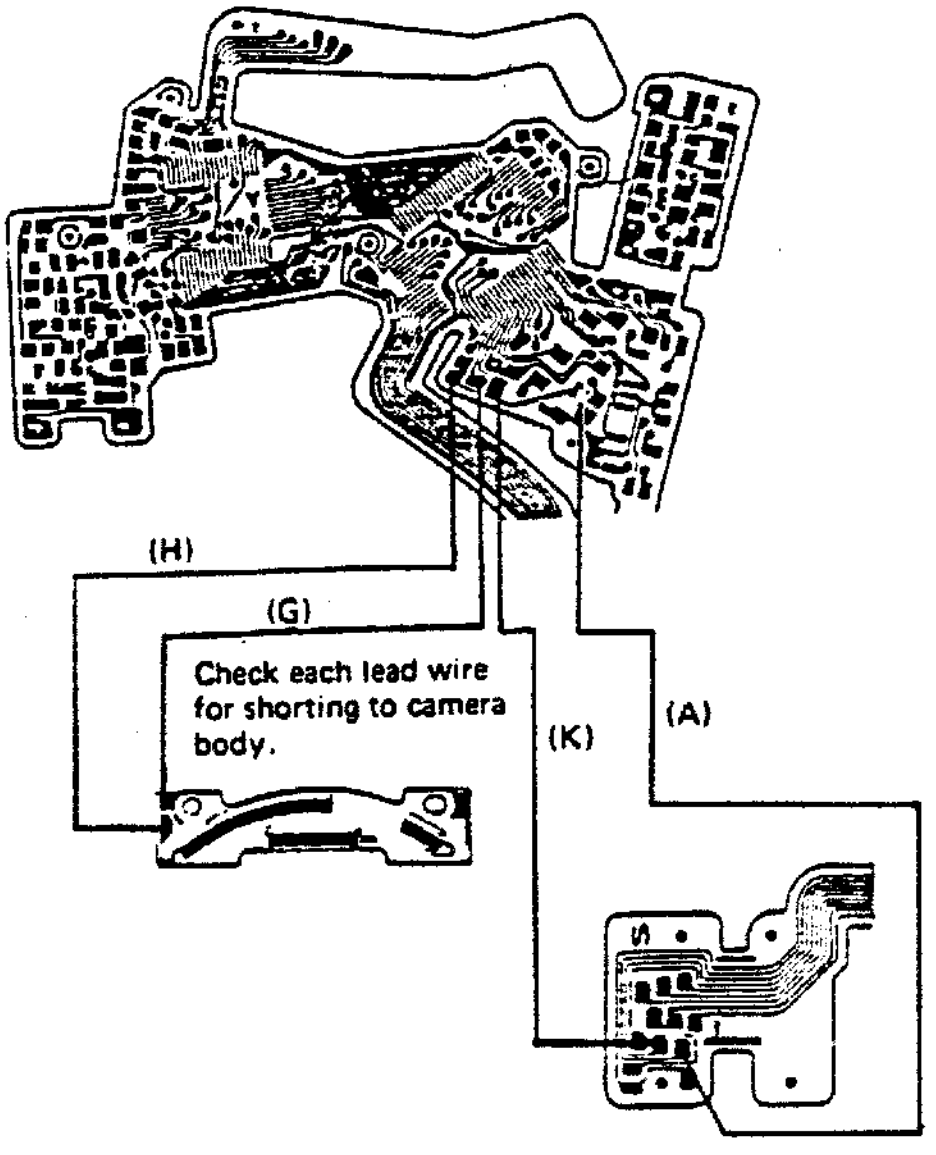
- 1.8 V: OK
- Vref exceeding 1.8 V: NO
- Vref lower than 1.5 V: NO

- <u>When Vref exceeds 1.8 V</u>

(1) TV, AV circuit: Each lead wire shorted to camera body. (PCV sounds during mode switching.)



Shorted to camera body

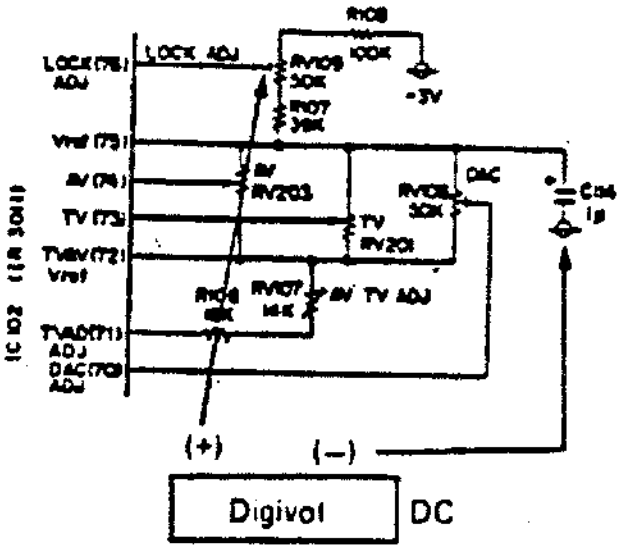


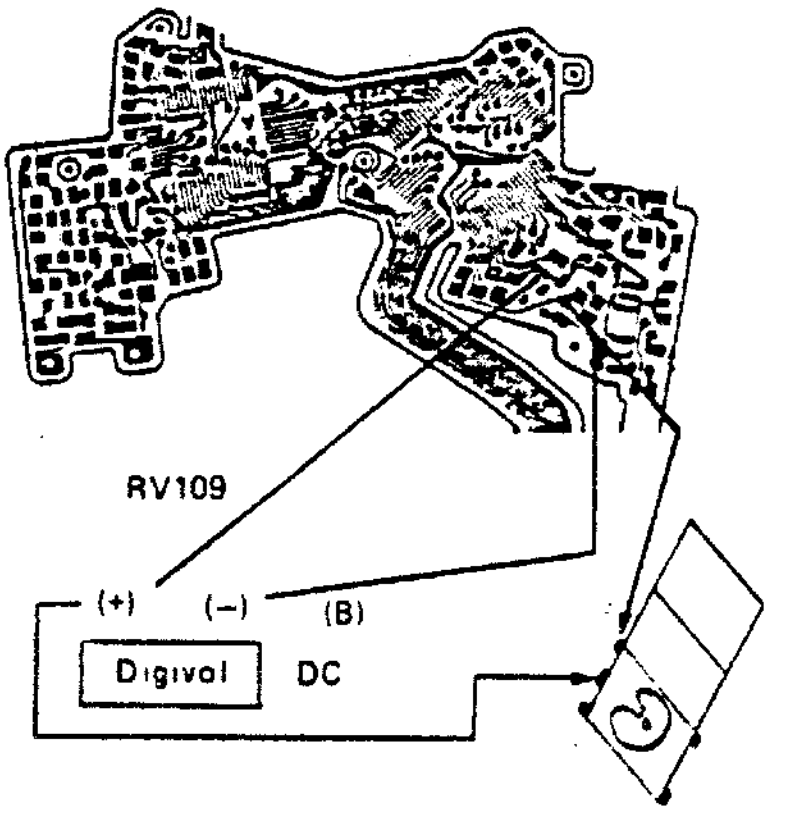
(2) B.P. IC defective

- When not shorted to camera body.

- When Vref is 0 V.

(1) Vref adjusting circuit normal?

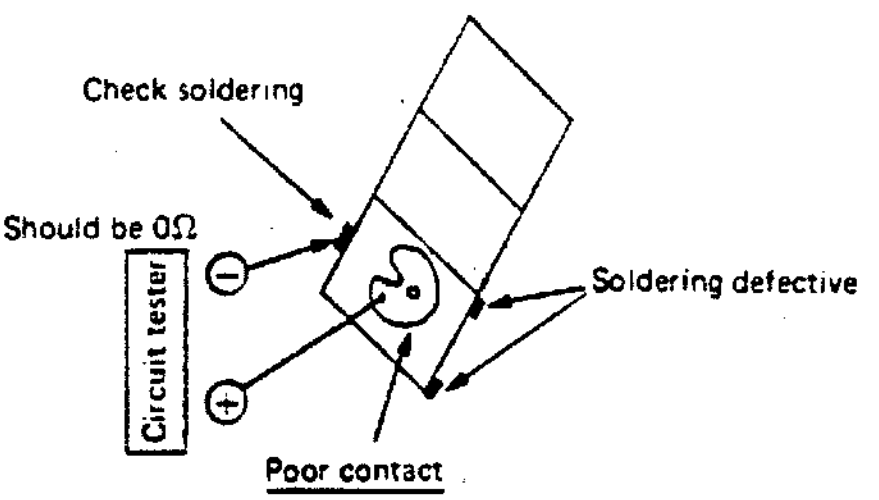




- DC 0.5 V or higher: OK

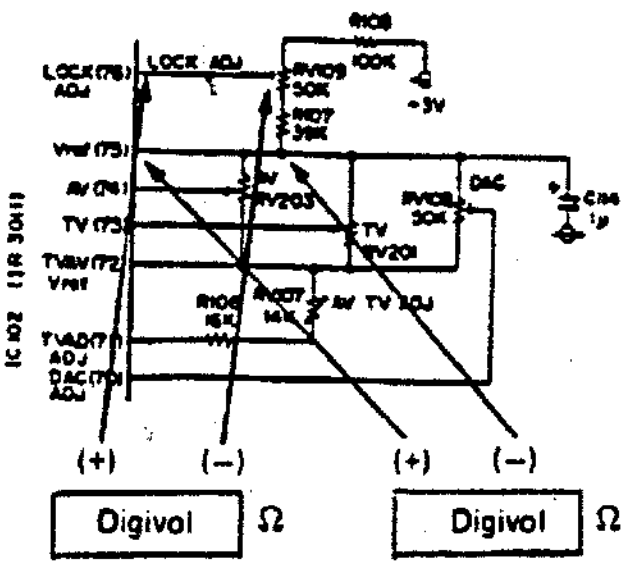
- When DC voltage is 0 V.

(a) Variable resistor contact or soldering defective
: Check variable resistor contact for poor contact with circuit tester.
Resistance should be 0Ω.
Resolder.



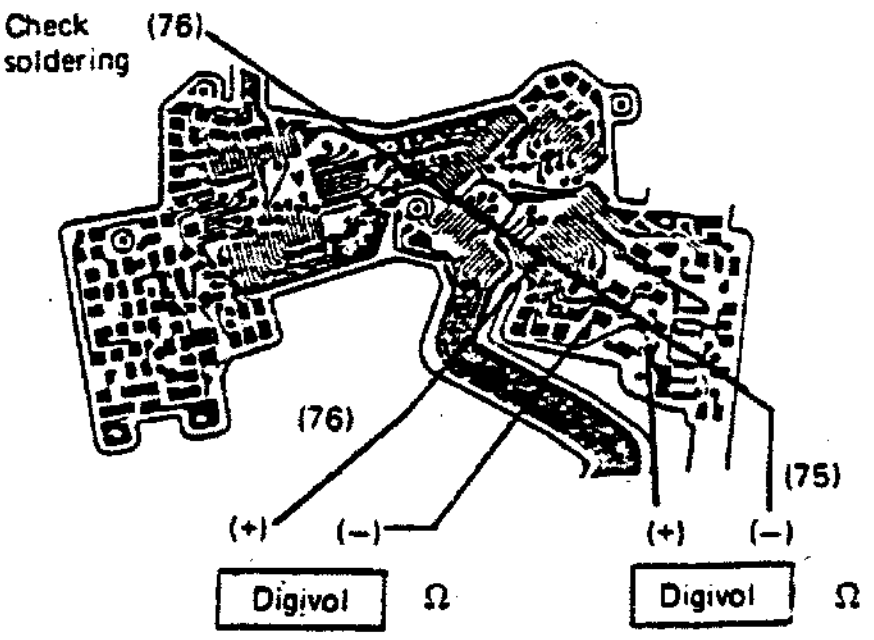
(b) No. 76 or soldering defective on bipolar IC.

(c) Pattern broken



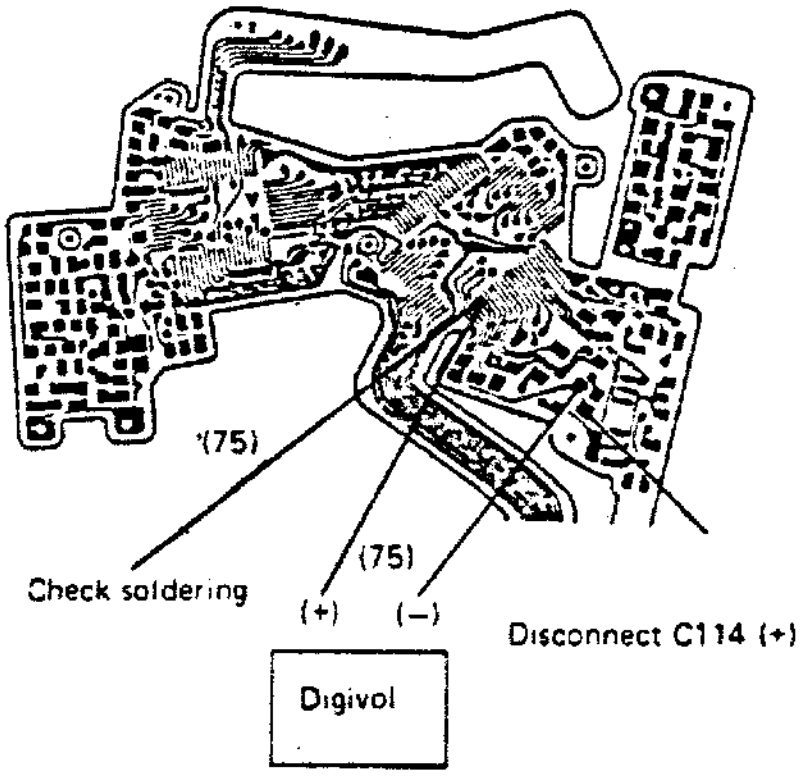
Should be 0Ω

Wire broken when resistance is some scores of ohms.

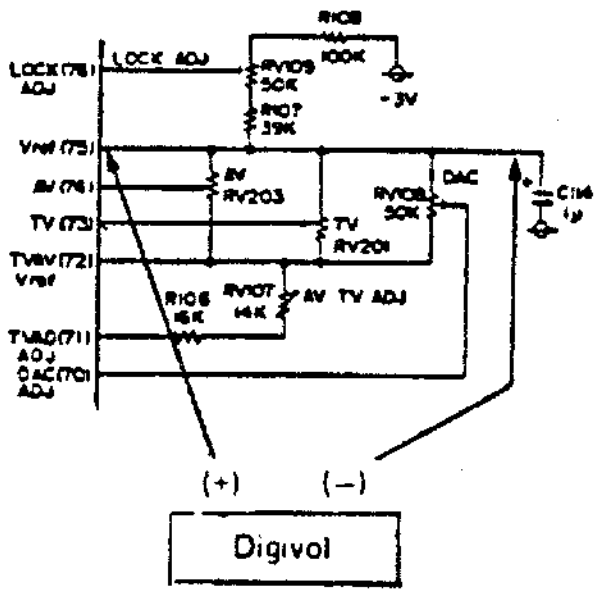


(2) C114 shorted

- Disconnect C114.
  C114 is defective when voltage is 1.8 V.
  Other part is defective when voltage is lower than 1.8 V.



(3) Pattern broken

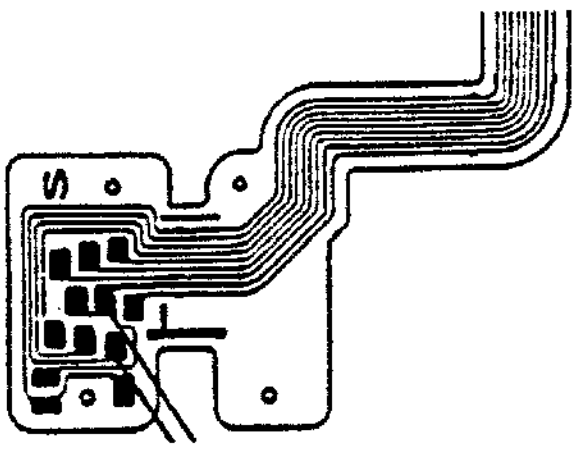


- 0Ω : OK
- Some scores of ohms: NO

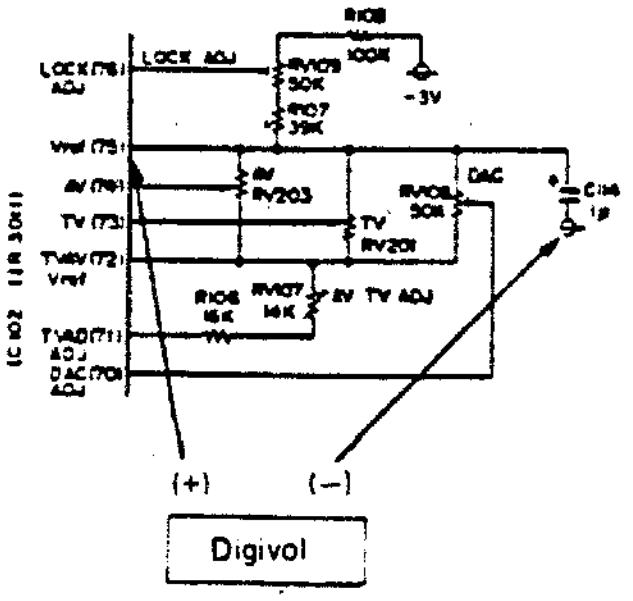
(4) No. 75 or soldering defective on bipolar IC supply.

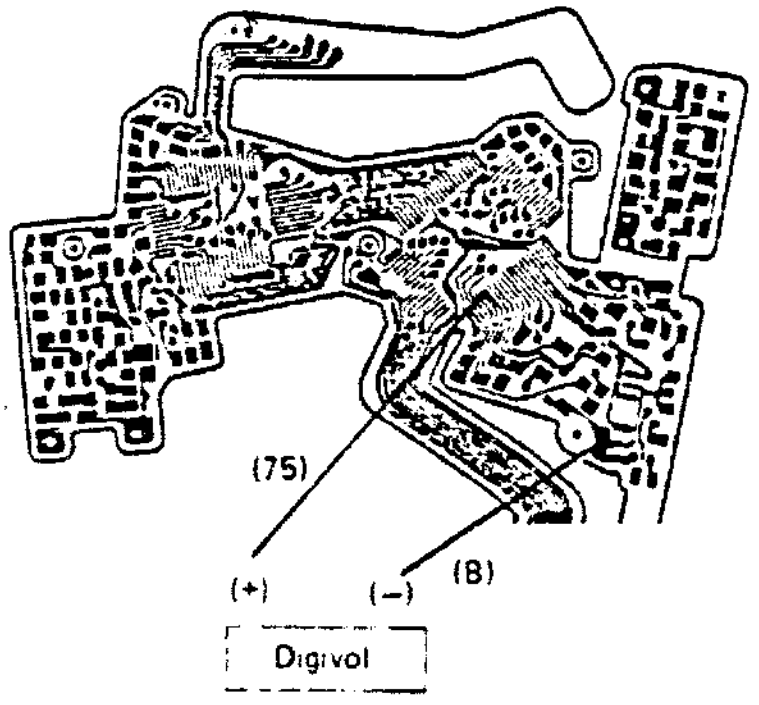
(5) Vref shorted to blue lead wire (−)

- Check blue lead wire to see if it is shorted to power supply (−) black lead wire.



(6) Vref outputted to No. 75?
(B.P. 75)





- 1.8 V: OK
- When voltage is 0 V

Bipolar IC defective.

8. **φ signal output provided?**

• See page E-111.

3-2. LCD Indication Abnormal

(1) No indication

- Preparations
  1. Measuring instruments: ○ Digivol or circuit tester
     ○ Synchroscope
  2. Mode: AUTO or MANUAL (lens should be attached in position)
  3. Light LCD indication.
- Shutter dial must not be set at B or mecha 1/60.

1. When shutter operates normally.

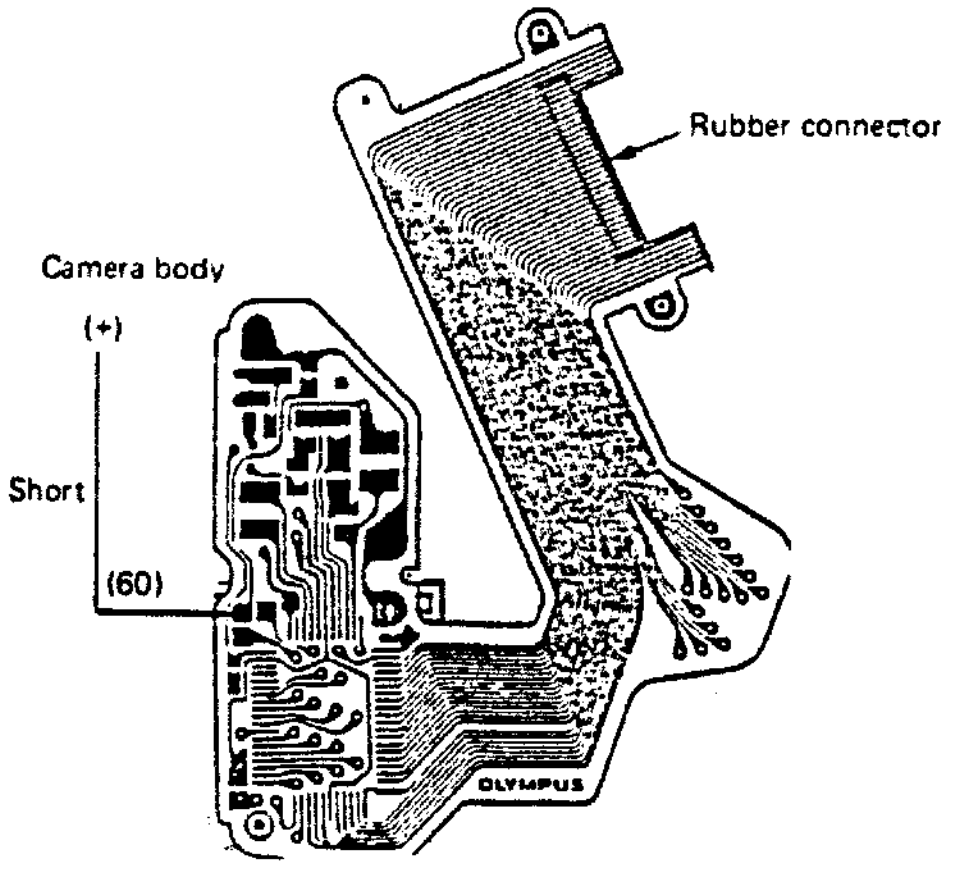
(1) LCD POW, ϕLCD or ϕ signal abnormal
(2) LC, CL or SD signal abnormal
(3) LCD D circuit defective
(4) LCD defective or LCD·D IC defective

- Make sure that the shutter can be released normally in both the AUTO and MANUAL modes.
- B.C. can also operate normally.

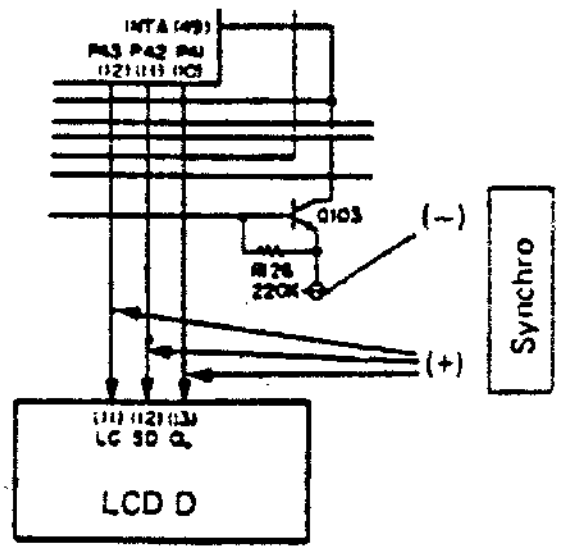
(1) Check of LCD (liquid crystal display)

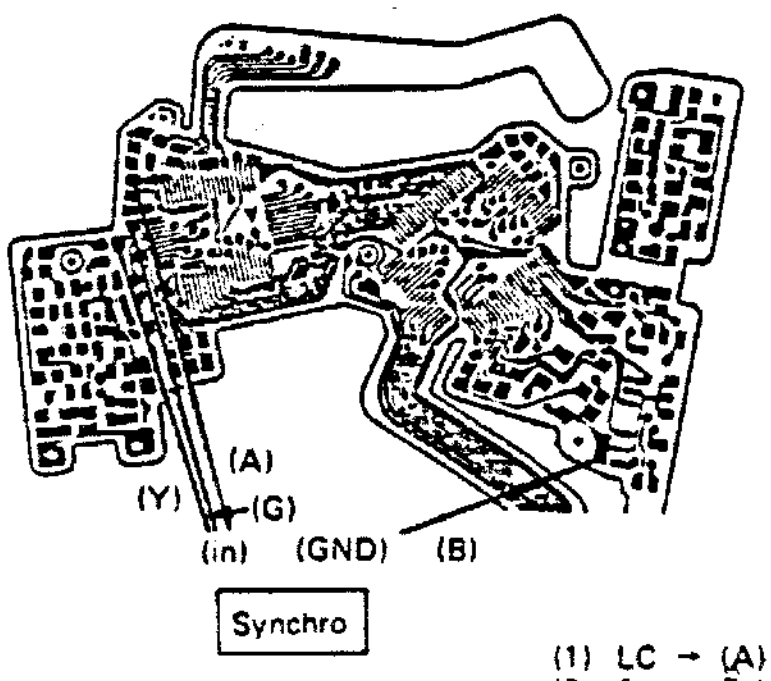
- Short camera body to LCD·D.
  When indications are obtained, LCD is normal.
  When no indication is obtained, LCD is defective.

- Check rubber connector
  ○ Positional deviation
  ○ Rubber connector broken



(2) Check of SD, CL and LC signals



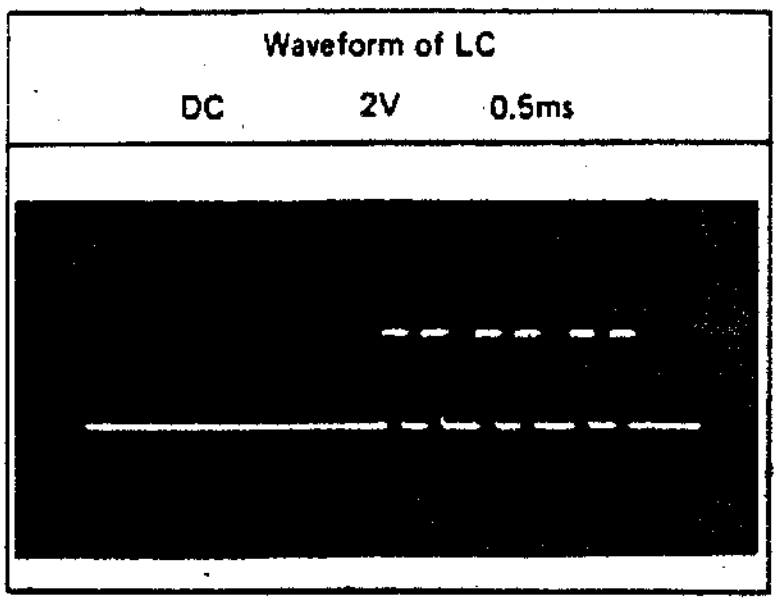


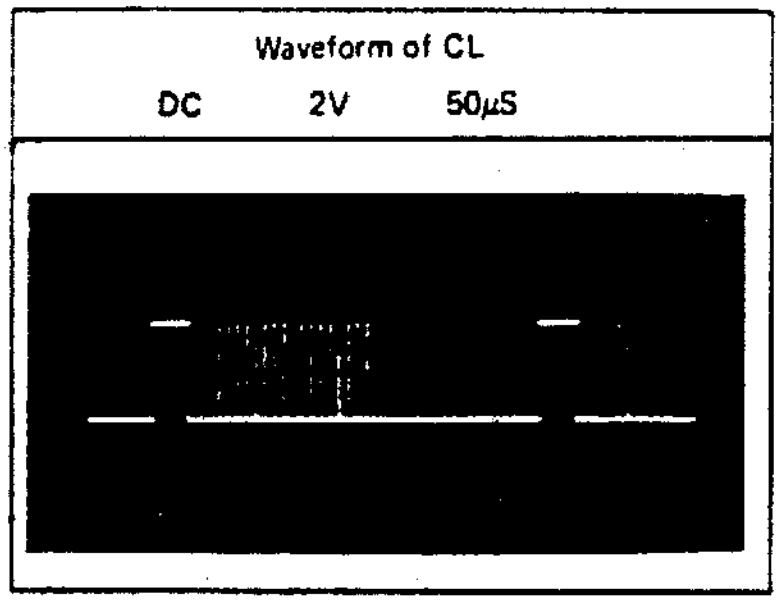
(1) LC → (A)
(2) CL → (Y)
(3) SD → (G)

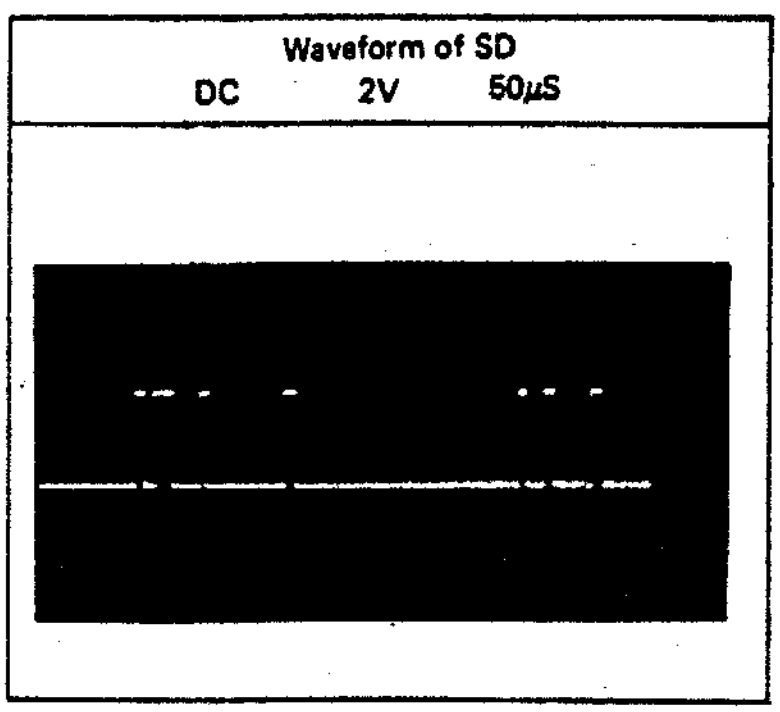
- Observe waveform on a synchroscope.
- Waveform should normall be as illustrated below: –

When waveform is not as shown below: → Check legs No. 10, 11 and 12 for soldering on CPU Check patterns between CPU and each land. → OK → CPU IC defective

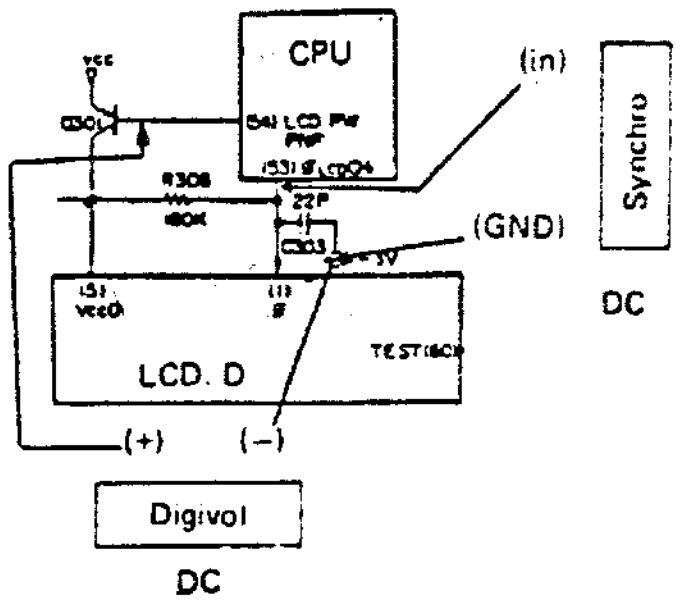
- Waveform is normal.

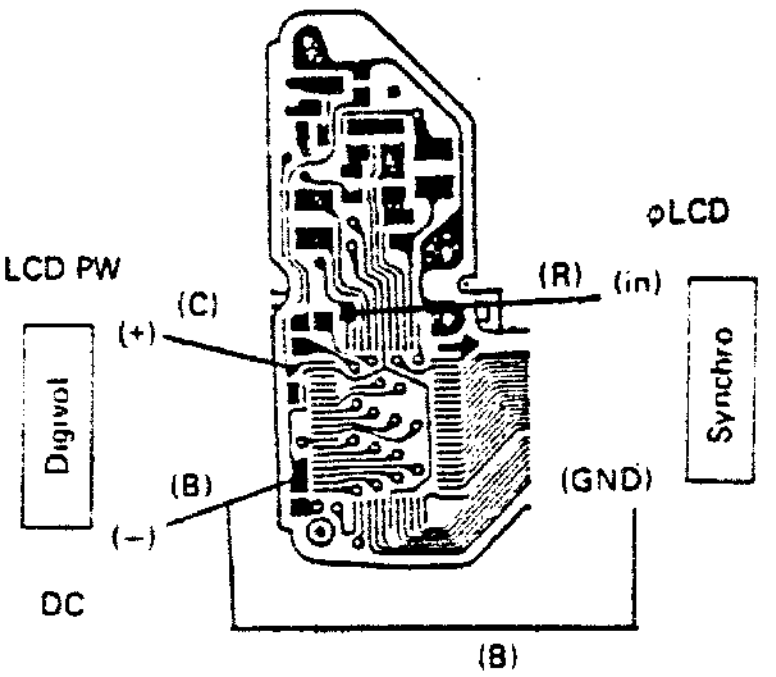






(3) Check of LCD POWER AND ϕLCD





- LCD POWER: Normally 2.4 to 2.6 V

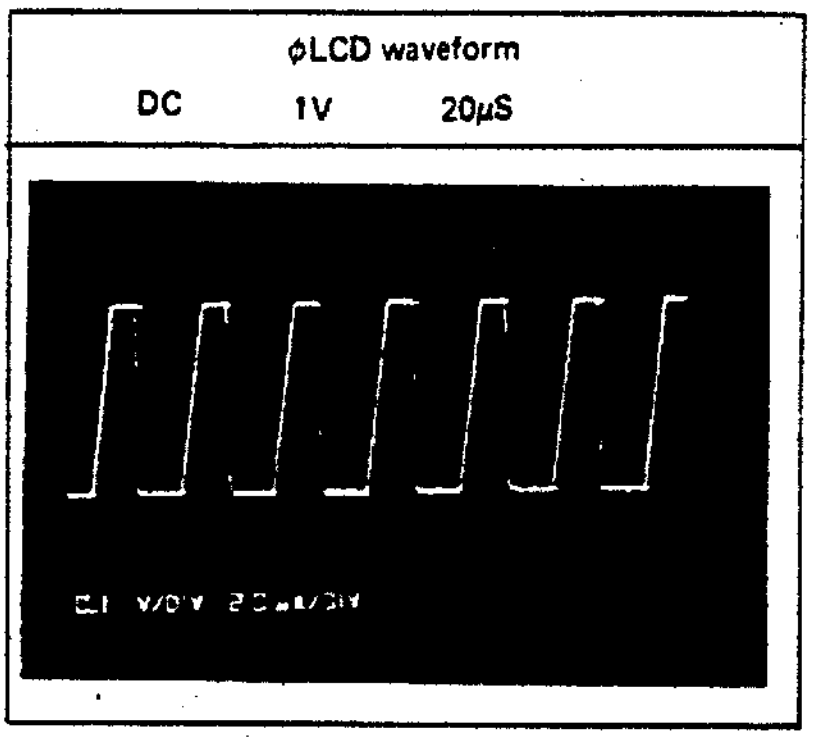
When output is not provided. → Check output from CPU.

- ϕLCD waveform is as shown on the right side below: OK

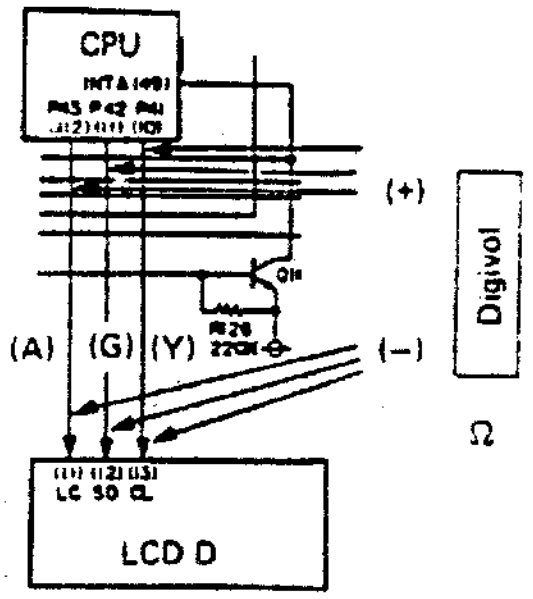
When output is not provided. → Check ϕ signal from CPU.

It is permissible to measure voltage by using a digital voltmeter in place of synchroscope.

DC 1 V to 2 V: OK (Standard 1.3 V)

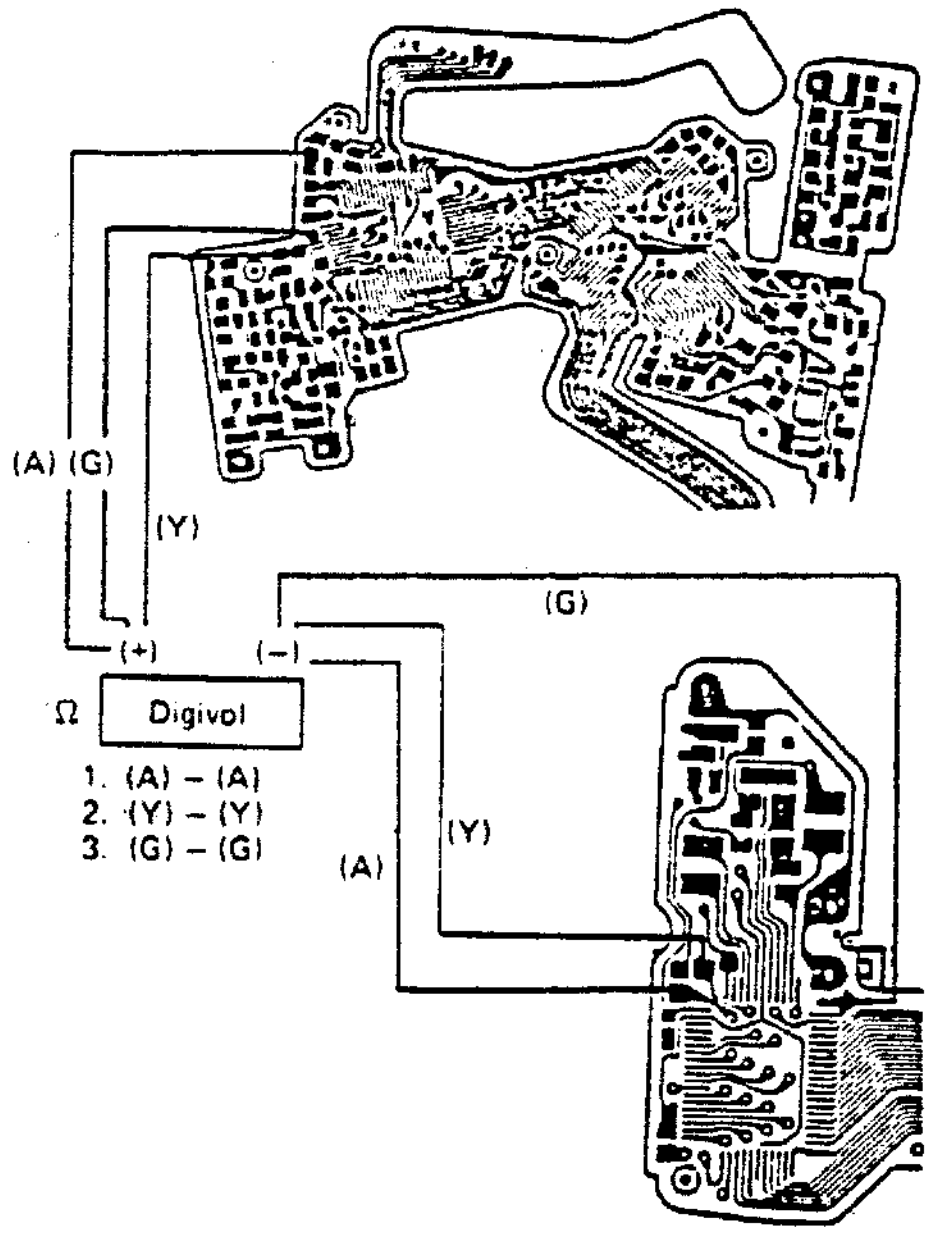


(4) When LCD POWER and ϕLCD output are provided in addition to SD, CL and LC outputs. Check SD, CL and LC circuits

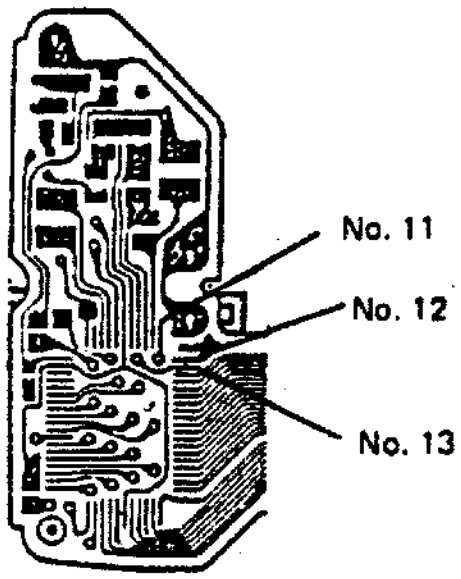


- Check each lead wire for soldering and breakage.
- Check resistance between patterns.
- Resistance should be 0Ω. ,
  Wire broken when resistance is some scores of ohms.
- Check LCD·D IC legs Nos. 11, 12 and 13 for soldering.

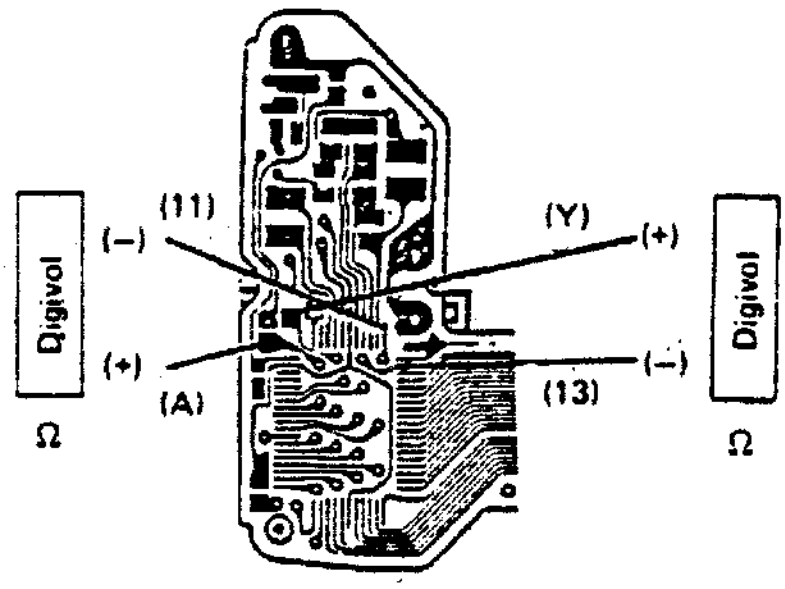
- Check lead wires



1. • Check of IC legs

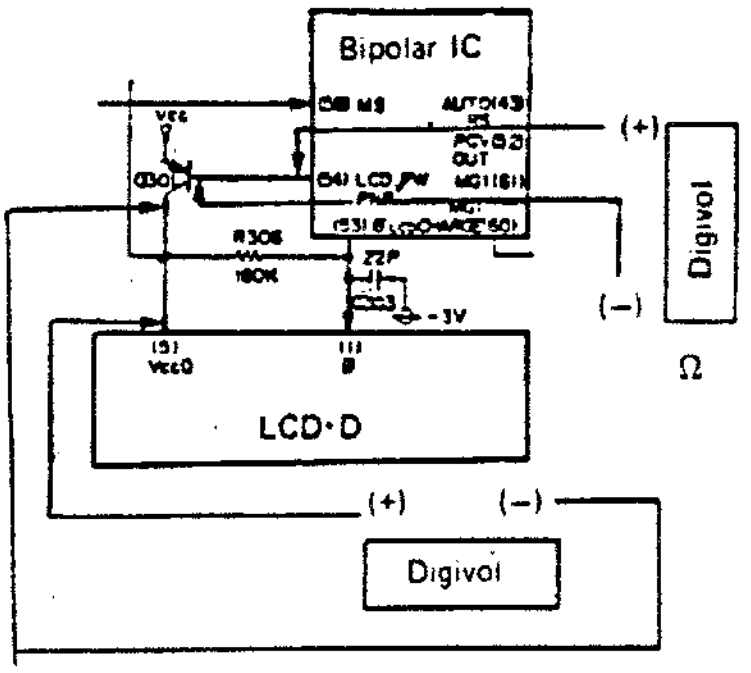


2. • Check of patterns



(5) When LCD POWER is not supplied from bipolar IC

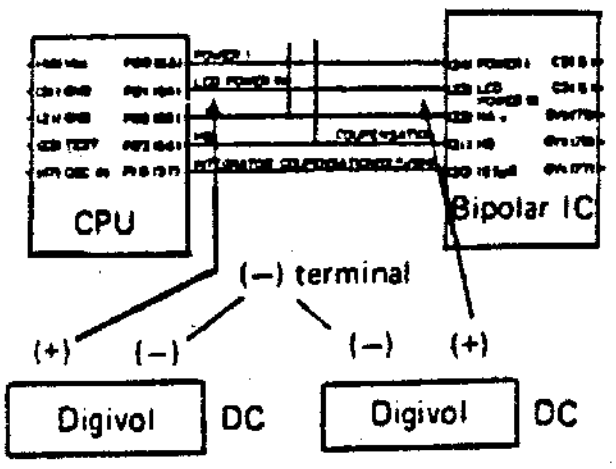
(a) Lead wire broken, pattern broken or soldering defective.



- 0Ω: OK
- Some scores of ohms: NO

(b) Check pattern and lead wire of power supply (−).

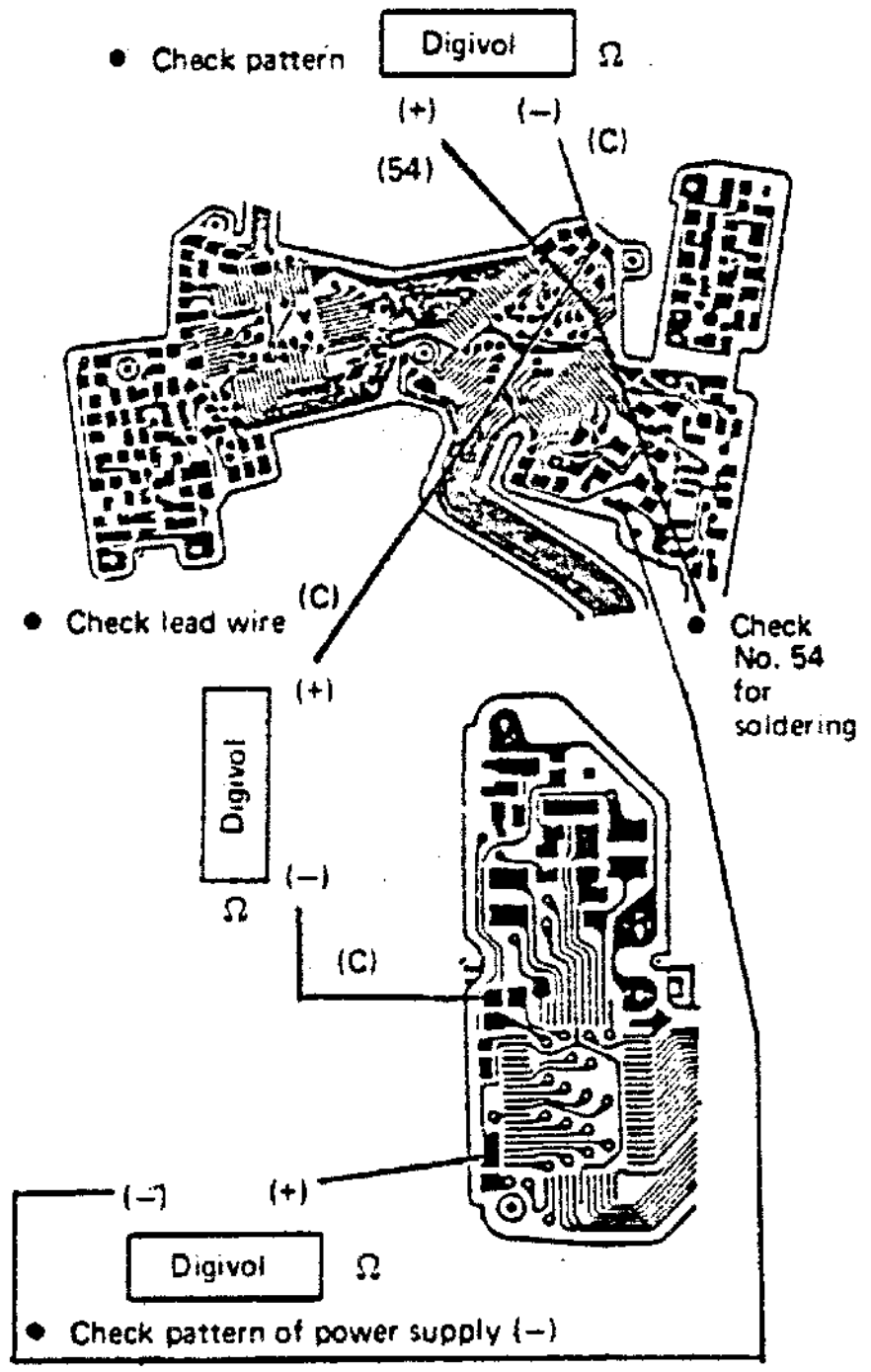
(c) LCD PW outputted from CPU?

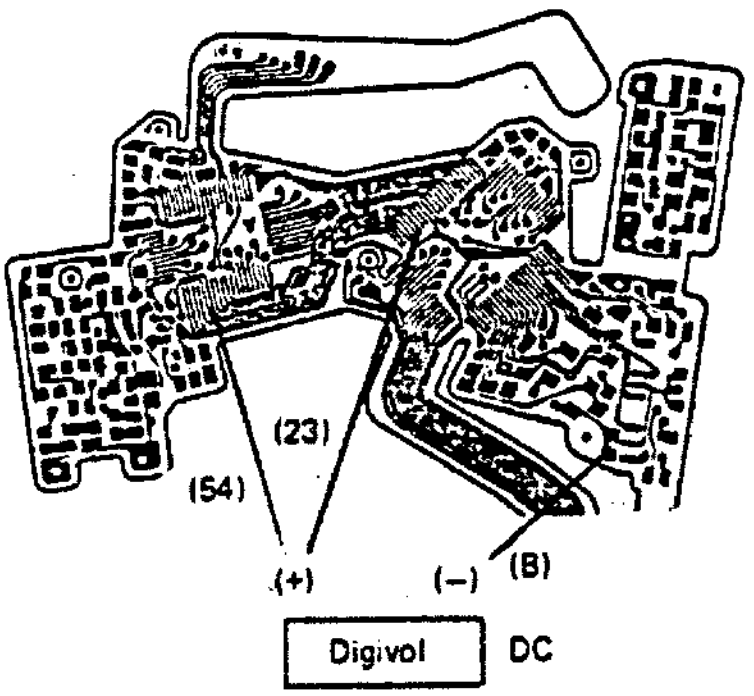


- DC 3V: OK

- When DC voltage is 0 V
  - CPU IC defective

- Check pattern
- Check lead wire
- Check No. 54 for soldering
- Check pattern of power supply (−)





1. (B) – (54) (CPU output)
2. (b) – (23) (B.P. input)

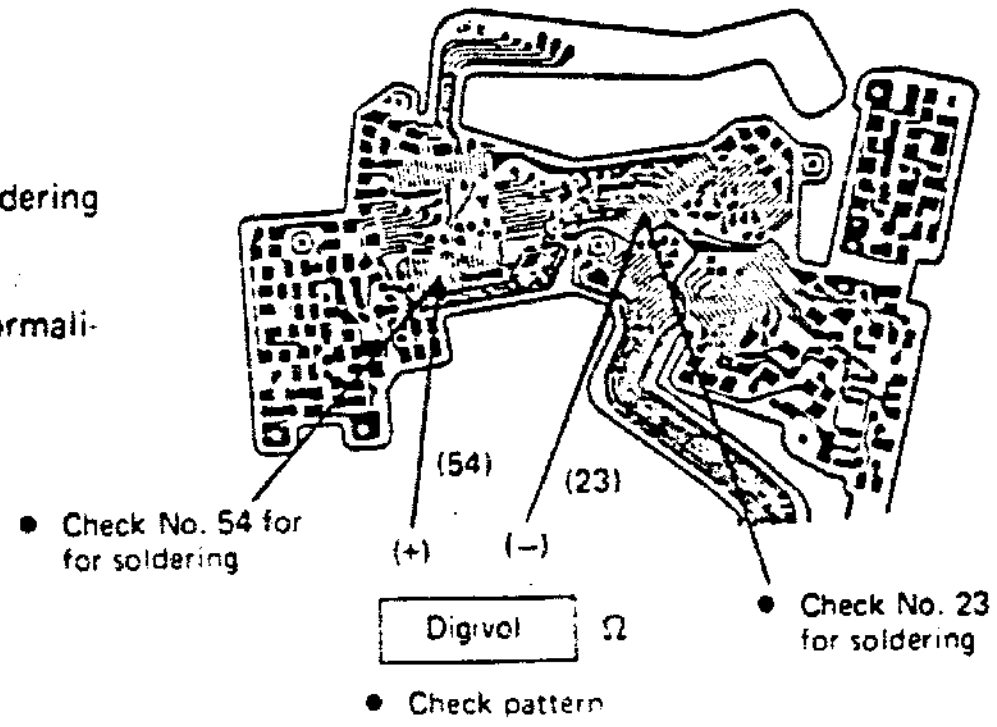
(d) No bipolar IC input

- When CPU output is available

(1) Check pattern for breakage
  : 0Ω: OK
  : Some scores of ohms: NO

(2) CPU No. 54 or B.P. No. 23 soldering defective.

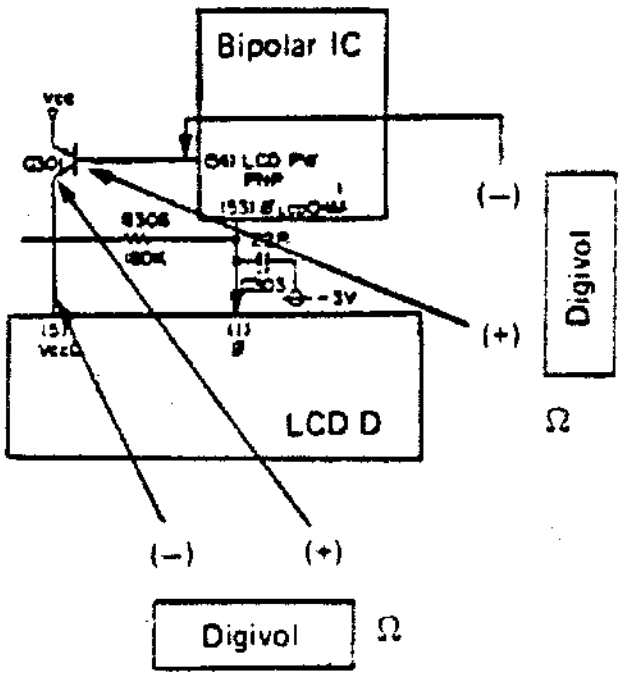
(3) When above checks detect no abnormality.
  B.P. IC defective

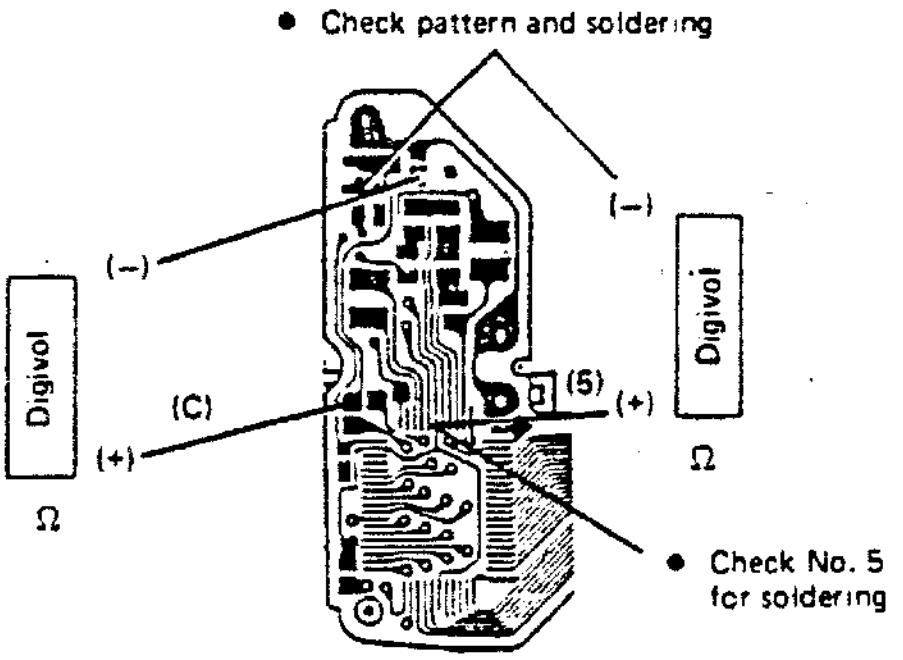


LCD POWER

(6) When output provided from bipolar IC (2.4 to 2.6 V)

(a) Pattern broken



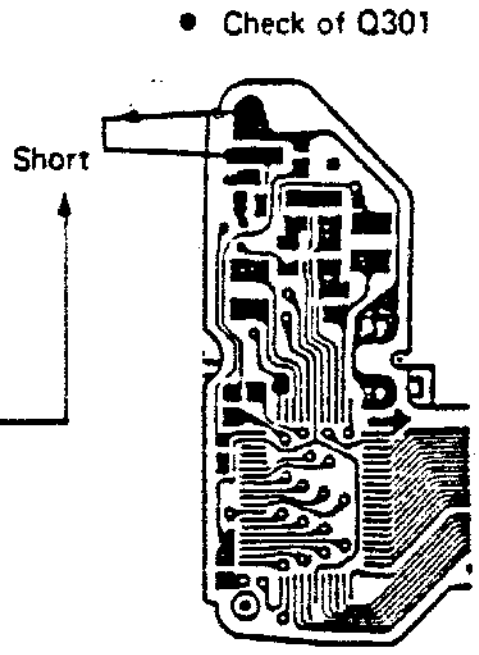


- 0Ω: OK
- Some scores of ohms: Breakage

(b) Defective soldeirng of LCD·D pin No. 5.

(c) Q301 defective
- Resolder each leg of Q301.
- Short collector and emitter of Q301.
  - Q301 defective when indication is obtained.

(d) Another circuit or LCD·D IC defective.

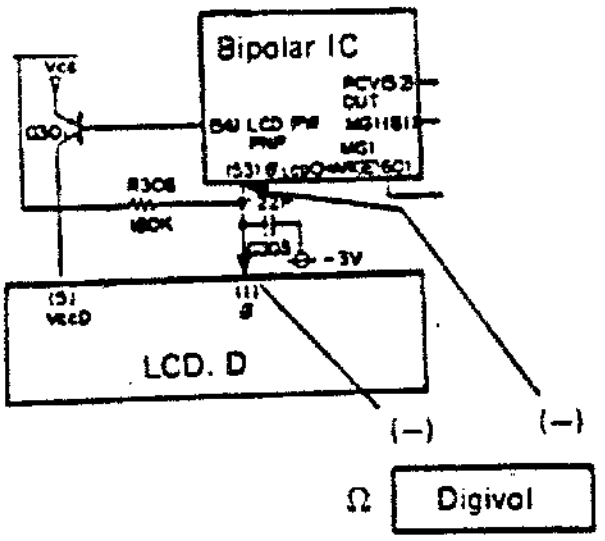


φLCD

(7) No output from bipolar IC

(a) Pattern broken

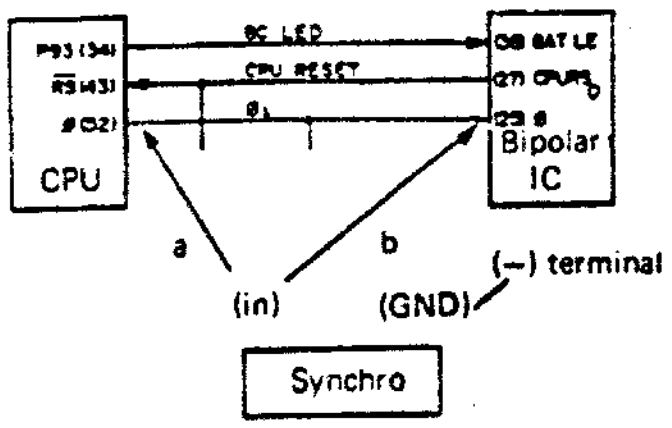
- When PCV sounds in B.C. mode.



(b) Defective soldering of B.P. No. 53.

(c) No φ signal outputted from CPU. mode.

- When B.C. does not sound



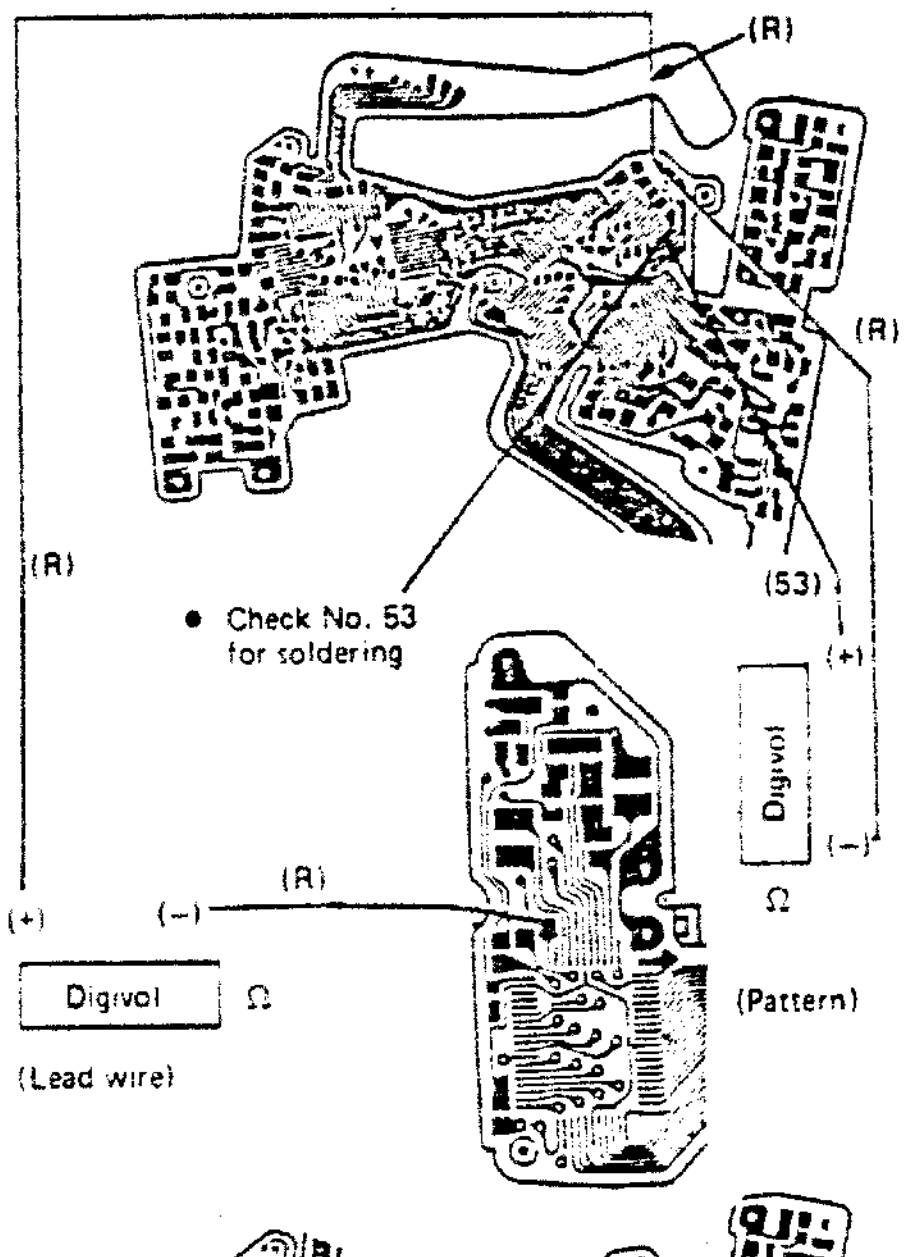
1. CPU output should normally have the waveform shown on the right side.

When CPU output is not provided → CPU IC defective

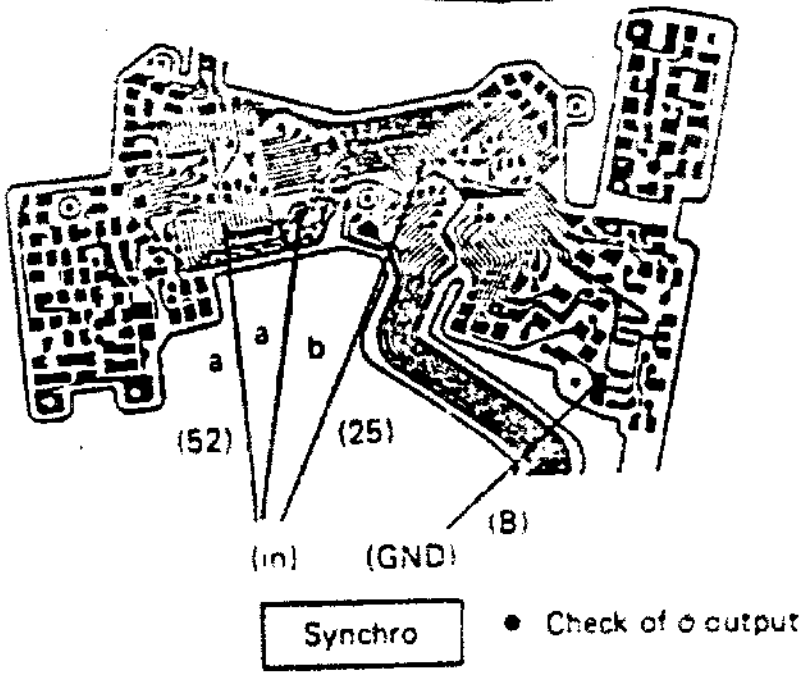
2. Input signal provided to B.P.?

○ When input signal is not provided
Pattern broken or defective soldering of No. 25.

- Check of lead wire, pattern and soldering

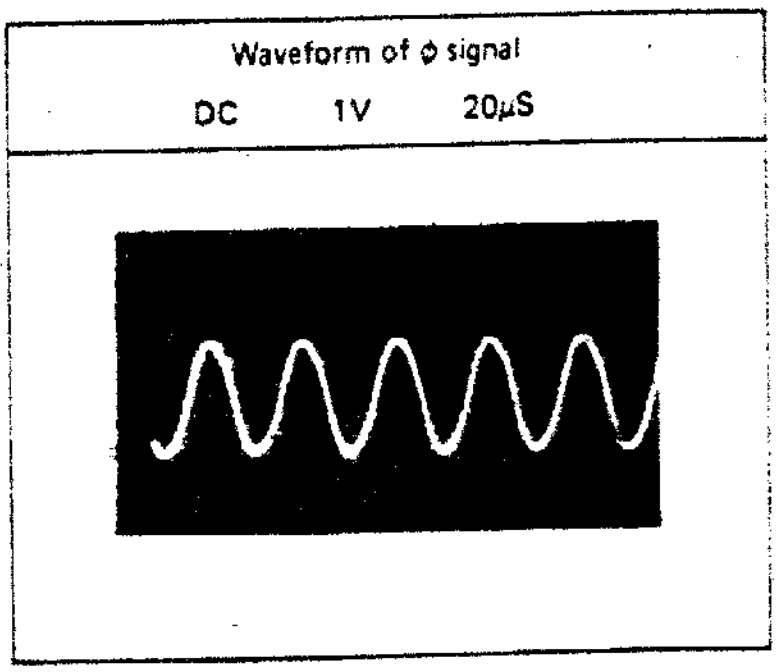


- Check No. 53 for soldering



- Check of φ output

- Normal waveform of φ signal

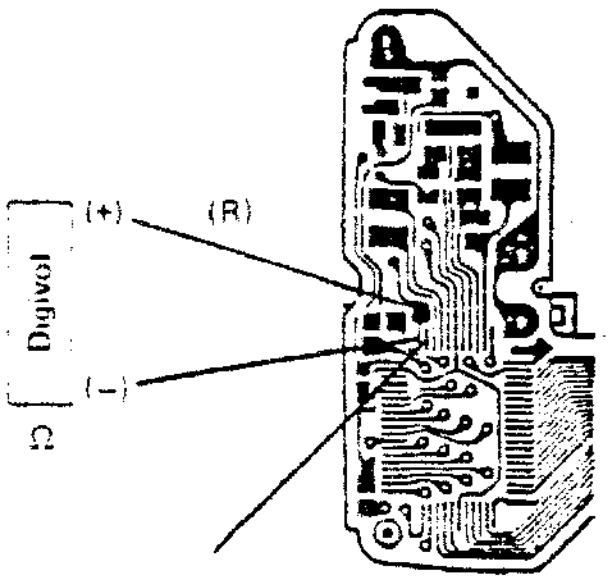


◇LCD

(8) When output Provided from bipolar IC

(a) Pattern broken

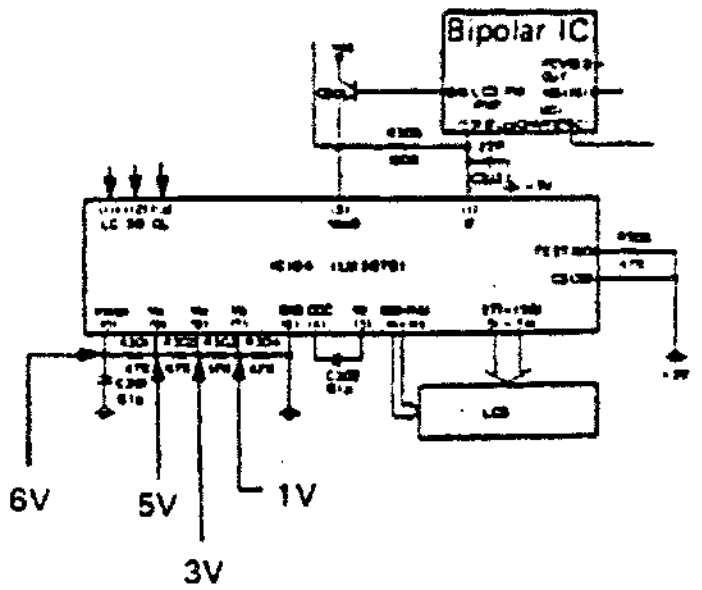
(b) Check LCD·D IC leg No. 1 for soldering



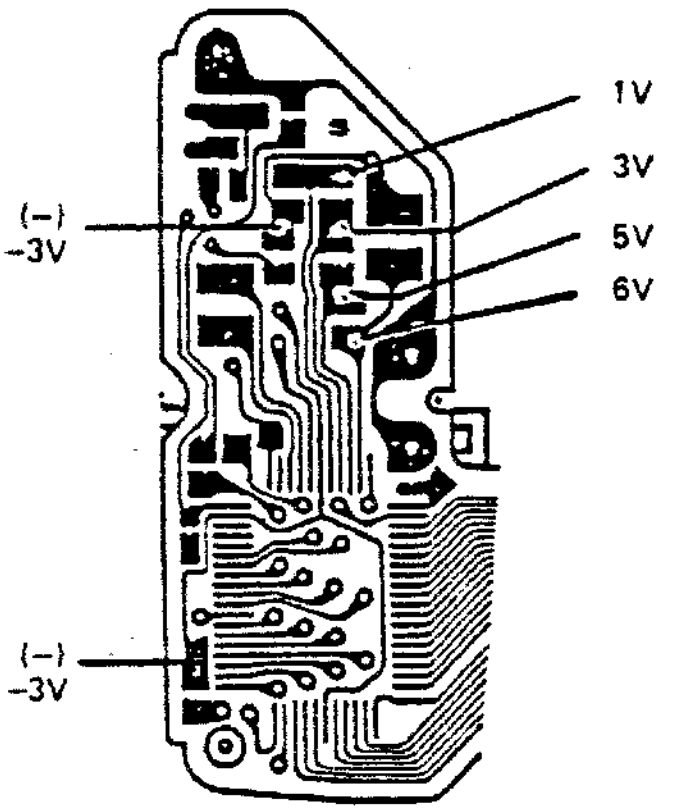
● Check leg No. 1 for soldering

(9) LCD D circuit defective

* Voltage in normal condition



• Voltage check



• All voltages should normally be as shown above.
All voltages are measured from (−) 3V line.

(a) 6 V not outputted as V_{DISP}

• No indication

(1) C301 shorted

- Indication faint when wire is broken.
- Measure voltage across both ends of C301.
  0V: Shorting

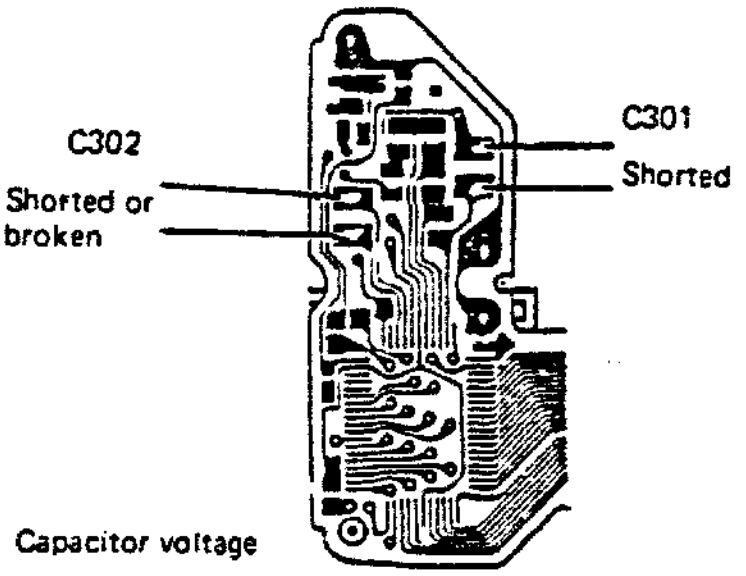
(2) C302 shorted or broken

- No indication when C302 is shorted or broken.

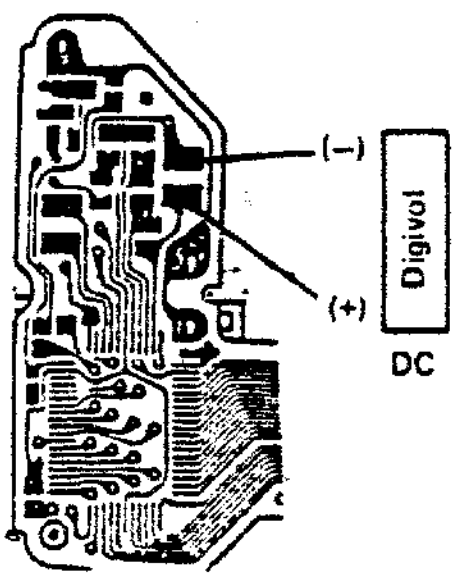
* Check procedure ,

Measure voltage across both ends of C301.

• Capacitor shorted



• Capacitor voltage



	Voltage of C301
C301 shorted	0V
C301 broken	4.2V
C302 shorted	3V
C302 broken	2.4V

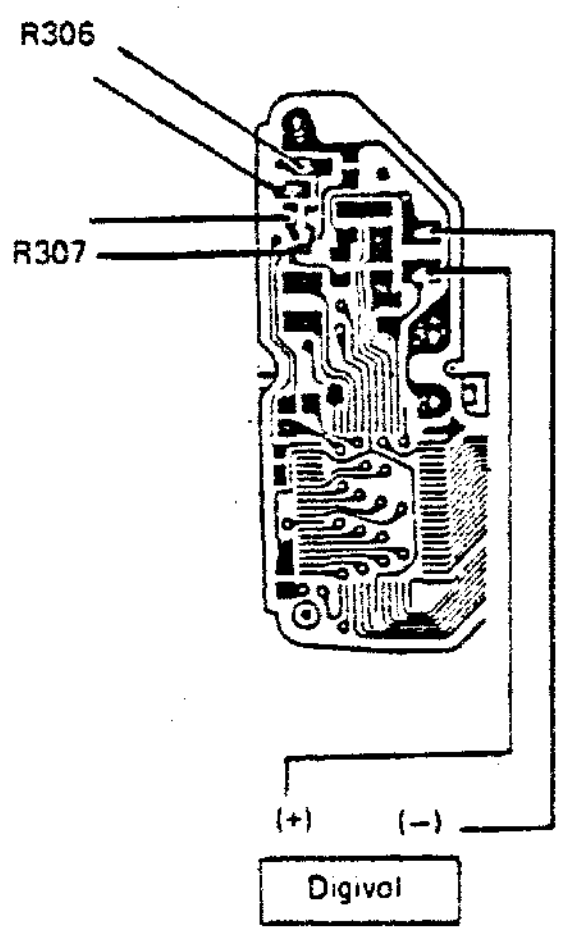
Note: Some items are indicated even when another resistor is defective.

(b) Check of R306 and R307 for shorting

- No item is indicated when R306 or R307 is shorted.
- Indication is normal when R306 or R307 is broken.

(1) R306 shorted
- Operate B.C. system.
  PCV does not sound in B.C. mode.
- Voltage across both ends of C301 is 2.2 to 2.4 V.

(2) R307 shorted
- Operate B.C. system.
  PCV does not sound in B.C. mode.
- Voltage across both ends of C301 is 2.4 to 2.6 V.

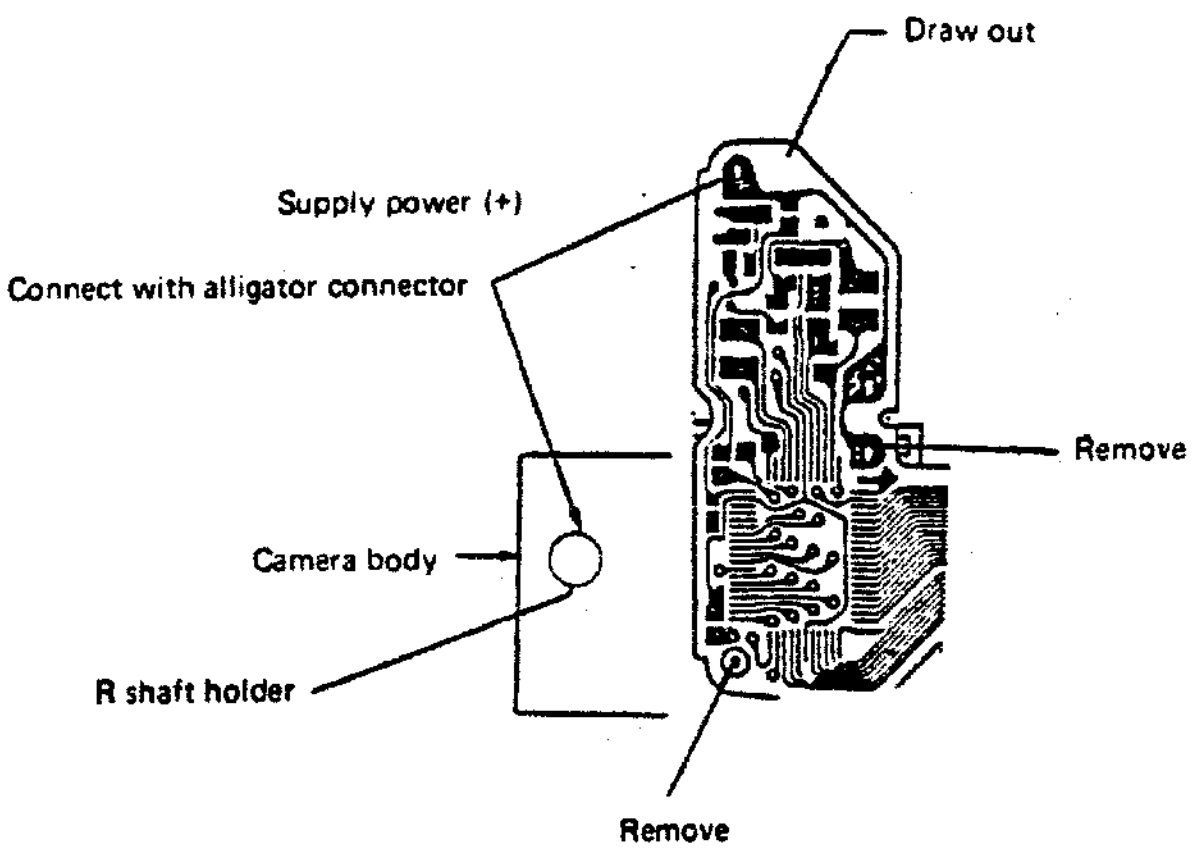


(10) LCD·D IC defective

- When the above checks are ineffective to locate cause and LCD indicates no item, wiring is erroneous or LCD·D IC is defective.
- Condition of LCD should be checked at the initial stage.

Note: For checking LCD·D circuit, proceed as follows:

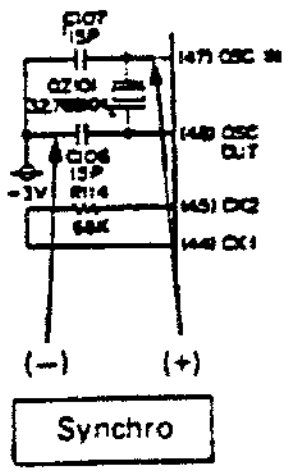
1. Remove setscrew from L circuit board.
2. Draw out folded circuit board.
3. Supply powe (+).

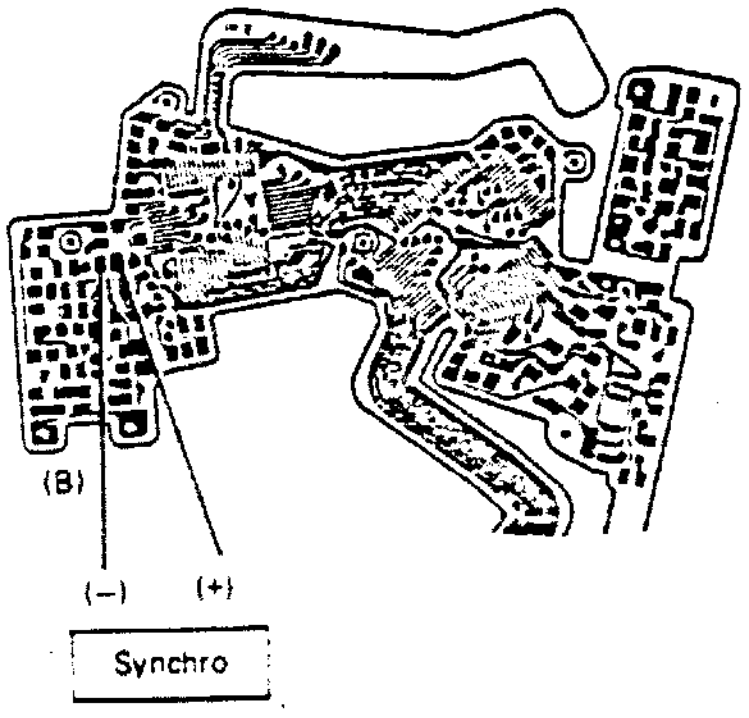


2. Shutter kept open in AUTO mode

- PCV does not sound in B.C. mode
- Shutter locked at its second and later operations in MANUAL mode.

- CPU oscillates?





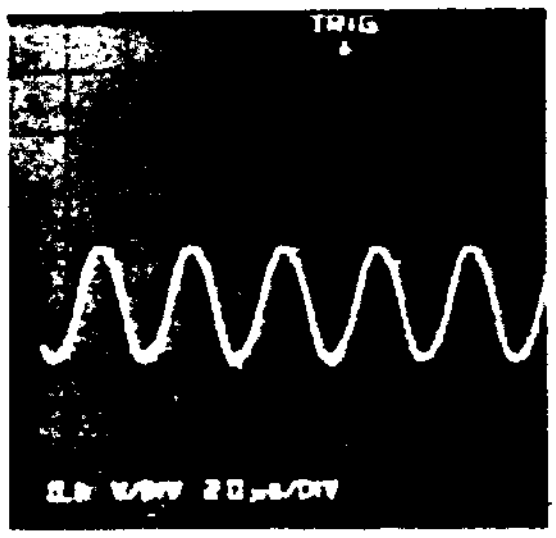
- OK when waveform is normal.
- Check by voltage measurement.

- Normal waveform

1. On positive side of C106 1.3 V ~ 1.5 V
2. On positive side of C107 0.9 V ~ 1.1 V

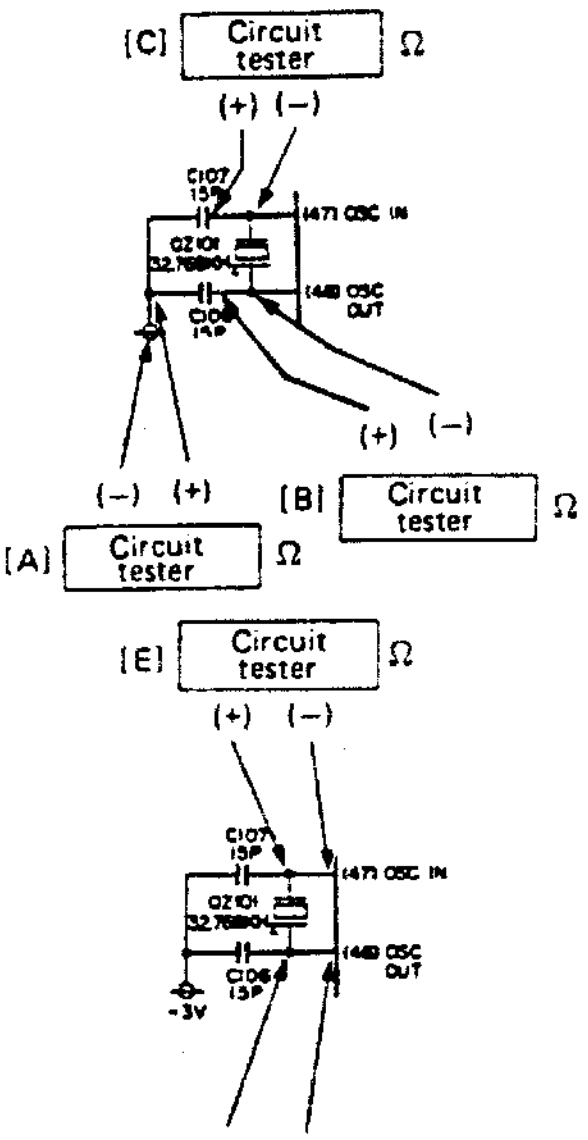
Waveform of φ signal

DC 1V 20ms



- When no waveform is observed

(1) Pattern broken

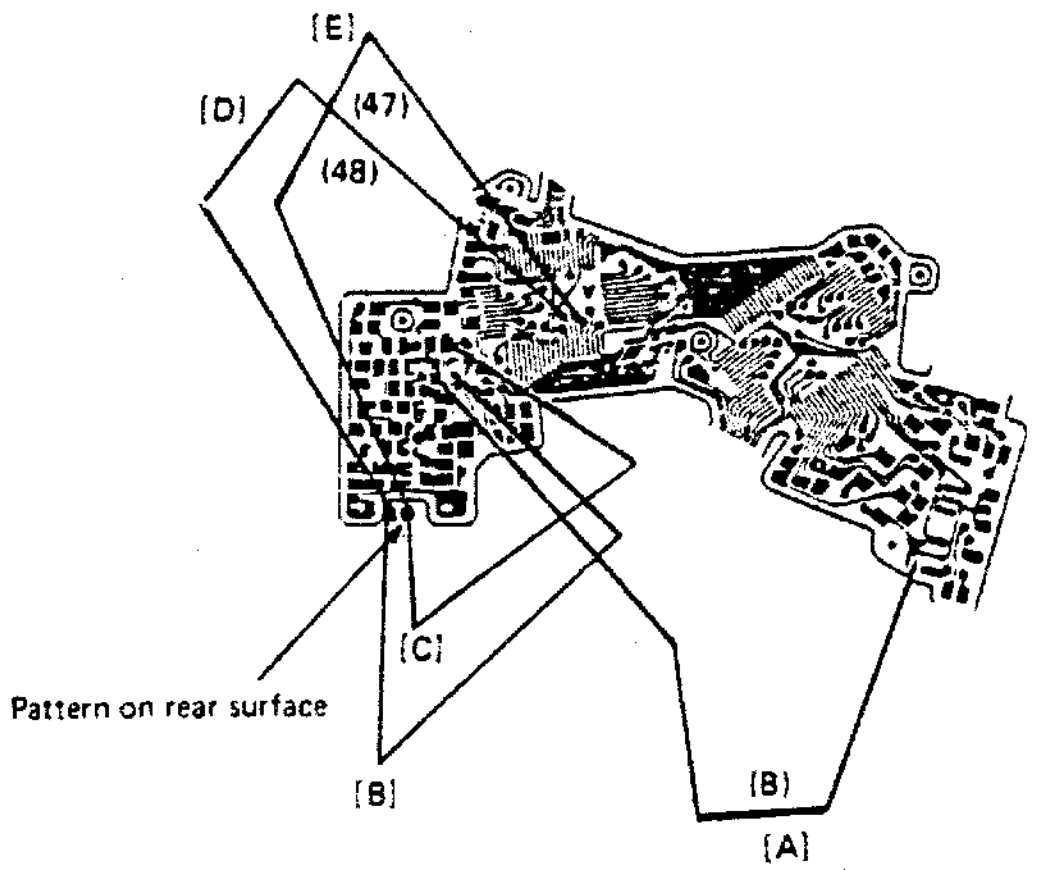


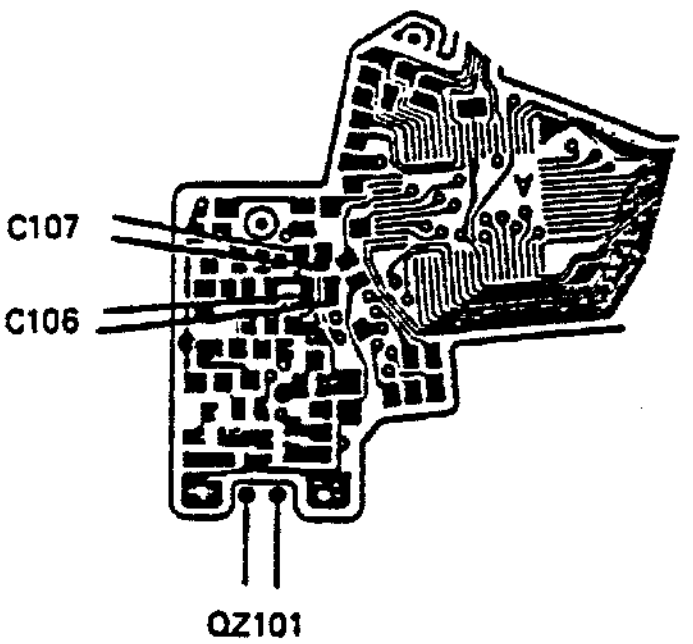
- Resistance should be 0Ω at each check point.
- When resistance is some scores of ohms, wire is broken.

(2) Crystal oscillator (QZ101) defective
- Replace

(3) C106 or C107 defective
- After disconnecting C106 and C107, check with a circuit tester set at X10 KΩ range.
- If a circuit tester having X10 KΩ range is not available, replace capacitor with new one.

- Pattern check





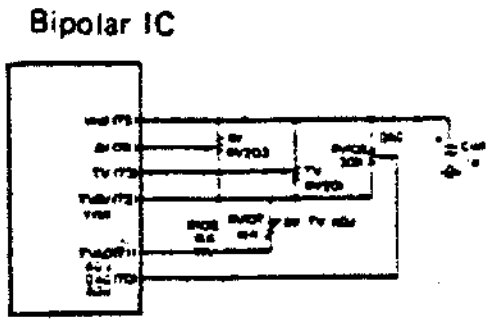
Shutter locked

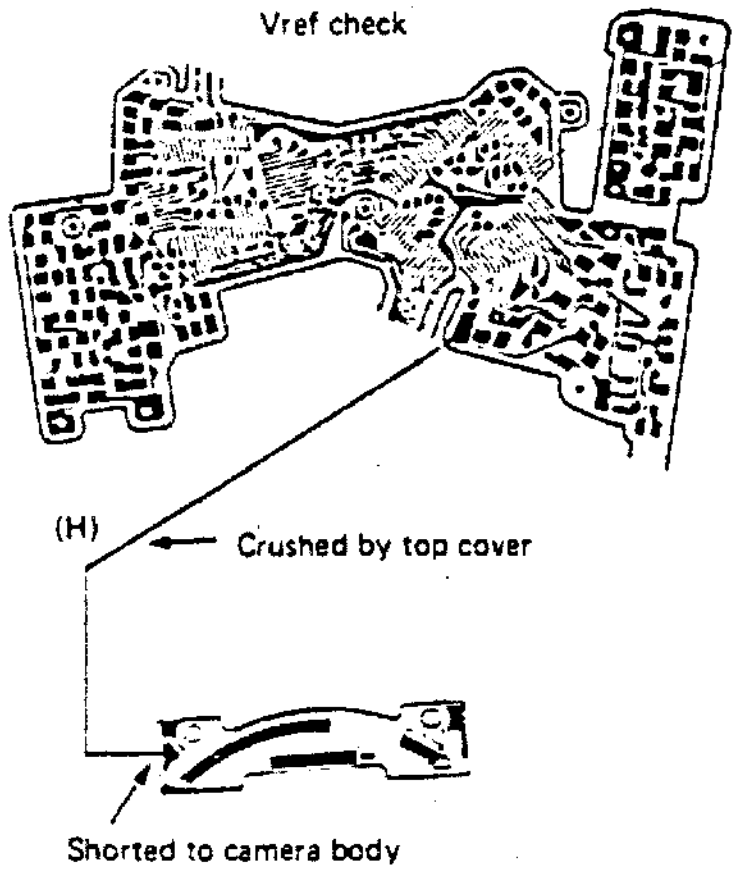
- Data input circuit defective

(1) TV circuit defective

(a) Vref lead wire for TV (gray) shorted to camera body.

- When shutter is operative with lead wire (gray) disconnected, it was shorted with camera body.
  (When the gray lead wire was shorted with (–) power supply, no LCD indication was provided.)



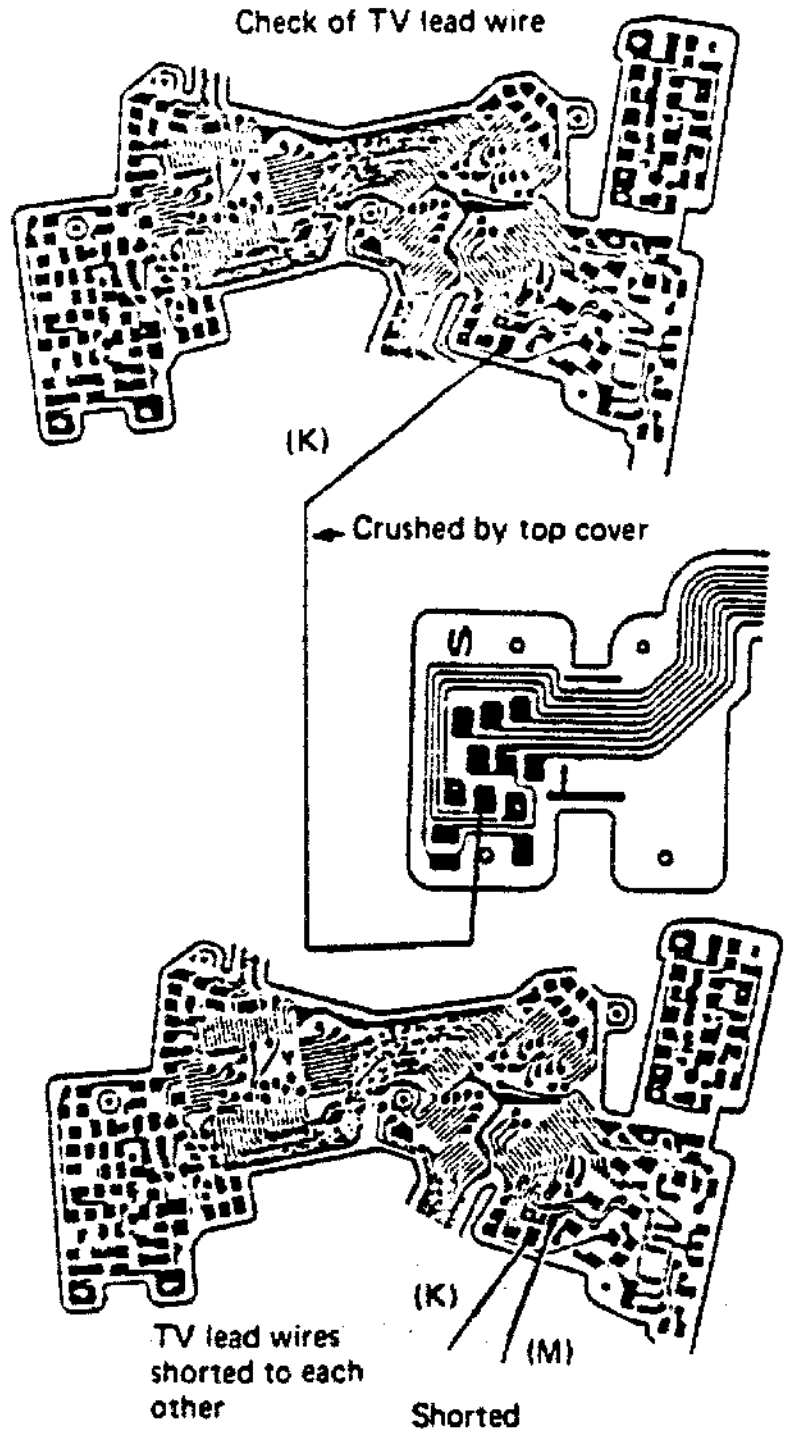


(b) TV lead wire for TV (light green) shorted to camera body.

- When shutter is operative with lead wire (light green) disconnected, it was shorted with camera body.
  (No indication is provided when a voltage exceeding 2.2 V is applied to TV input terminal.)

(c) TV lead wire (light green) for TV shorted to TVAV lead wire (purple).

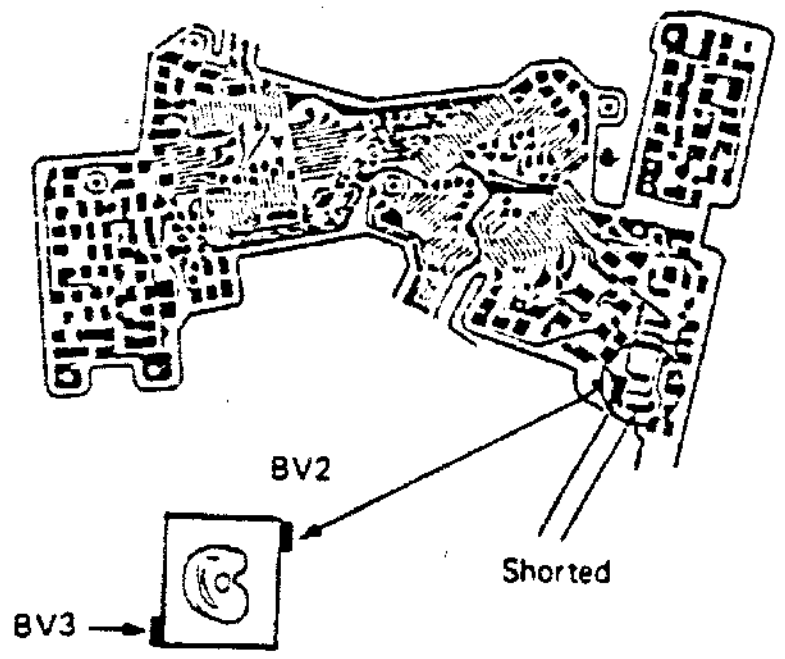
- When shutter is operative with either lead wire disconnected, the lead wires were shorted to each other.



(2) BV circuit defective

- BV3 terminal shorted to (−) terminal

Check of BV3



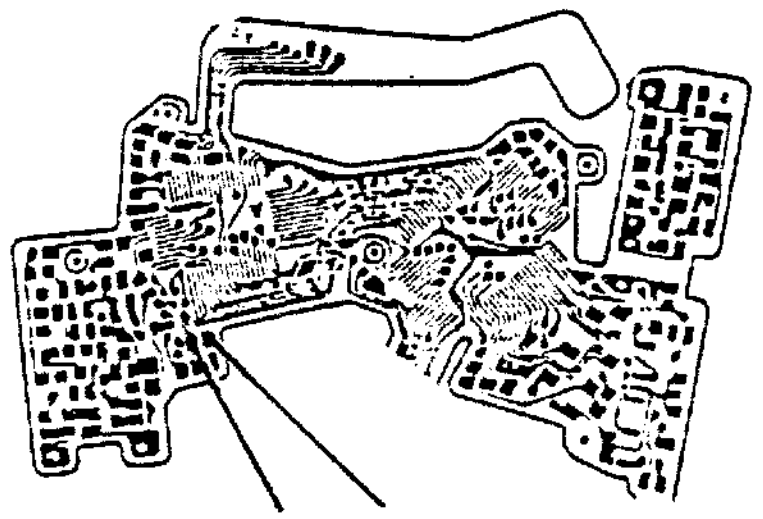
(3) System clock circuit defective

- LED lights.
- Resistor for CPU system clock

- R114 broken or soldering defective

  - When shutter is inoperative with no indication
    Set camera in B.C. mode.
    When LED lights, R114 is broken or soldering is defective.
  - When R114 is shorted, shutter is inoperative though indication is provided.

Check of R114

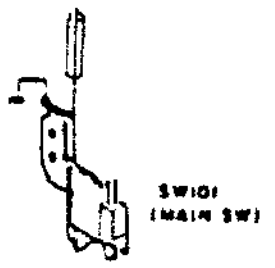


4. Shutter operates abnormally

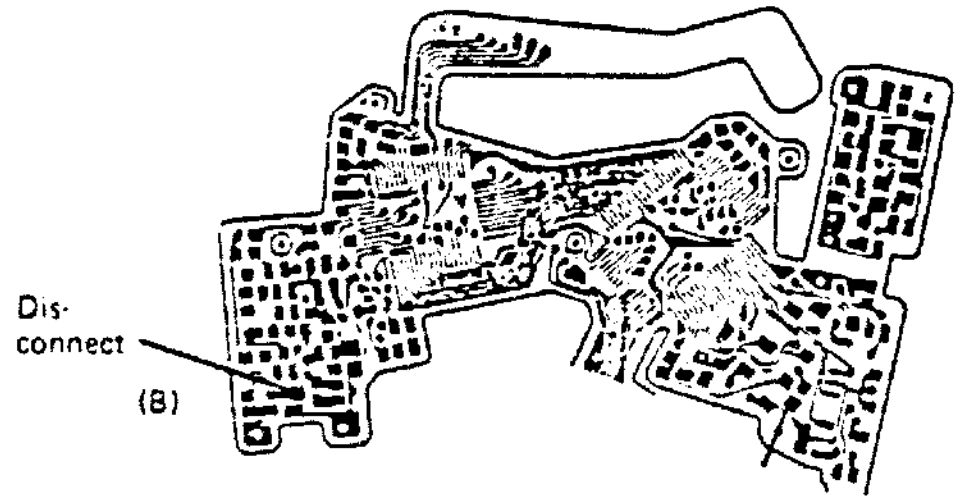
- Shutter speed is too high at low level in AUTO and MANUAL modes
- B.C. system is inoperative

(1) M. SW shorted to camera body
- Irritating noise made by film winding
- Disconnect M. SW lead wire (black). When indication is provided, M. SW is shorted to camera body.

Check of shorting between M. SW and camera body



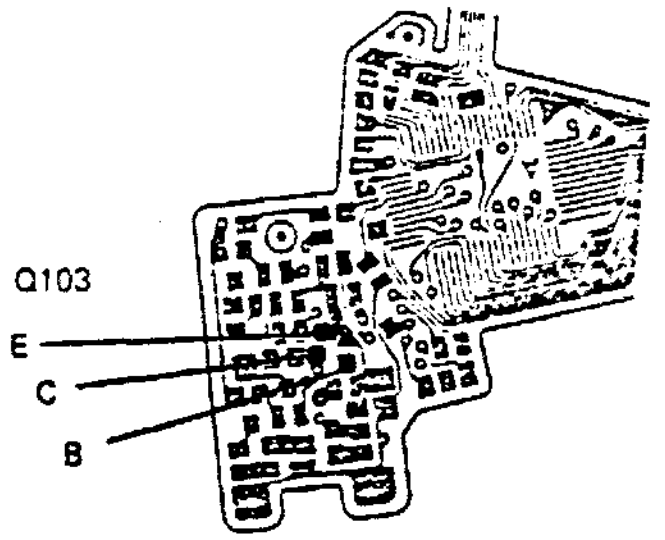
Disconnect M. SW lead wire (black)



(2) Shorting of Q103 E·C
- Shutter speed too low in AUTO and MANUAL modes.
- Shutter locked occasionally.
- Disconnect Q103. When indication is provided, Q103 is defective.
- Check soldering of Q103 E·C.

Note: Indication is not provided when trigger signal is 0 V (low possibility).

Check of Q103 shorting



(2) All Items Indicated

- All types of data are displayed simultaneously.
- Almost all types of data are displayed.
- This symptom is mostly traced to defective LCD·D circuit or LCD·D IC.

- Preparations
  1. Measuring instruments: a. Digital voltmeter or circuit tester
     b. Synchroscope
  2. Mode: a. AUTO or MANUAL (lens should be attached in position)
  3. Light LCD indicator.

- Do not set shutter dial at B or mecha. 1/60.

1. When shutter operates abnormally in AUTO or MANUAL mode.

CPU IC defective

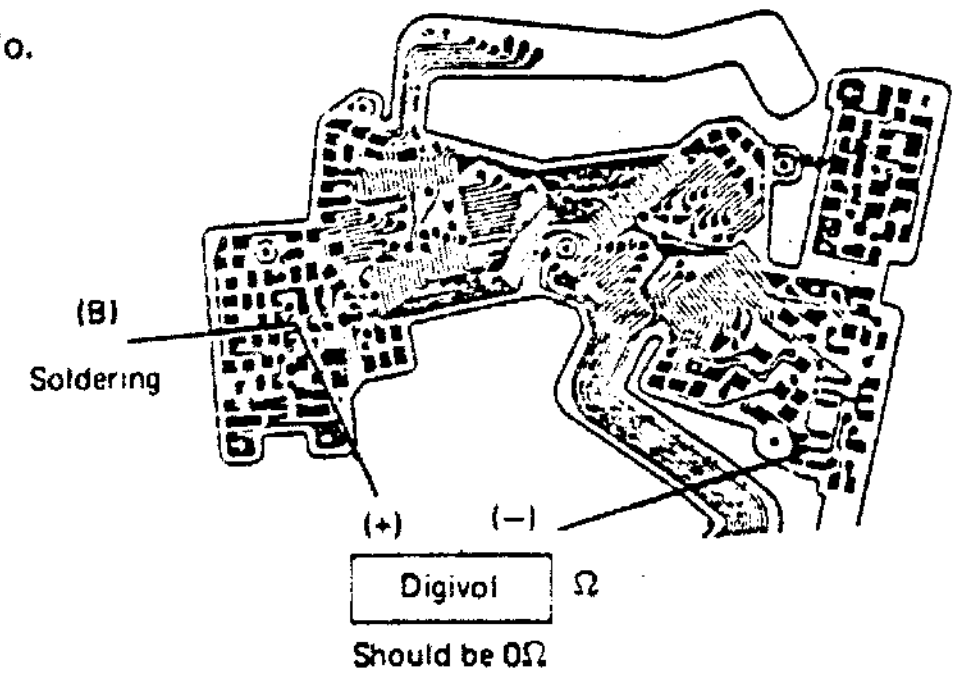
- When shutter operates abnormally when it is released in AUTO or MANUAL mode
- This trouble is generally unconcelvable.

2. When shutter operates normally

- Release shutter and make sure that it can operate normally in both AUTO and MANUAL modes.

- LCD·D circuit defective

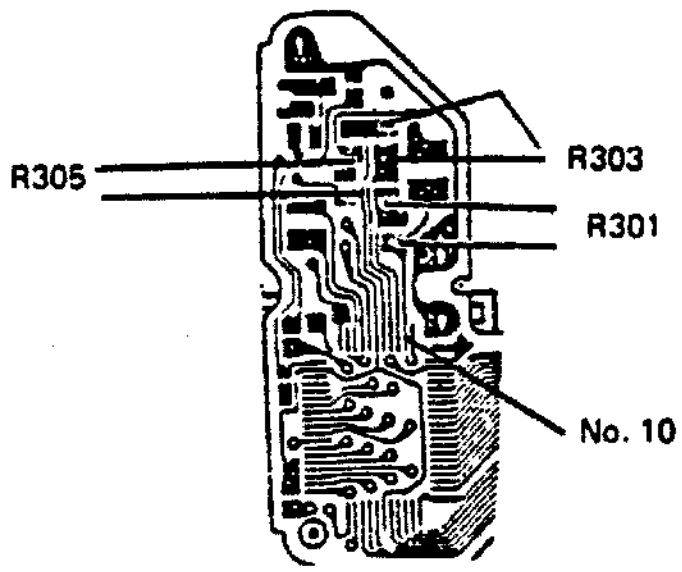
(1) (−) power line broken
- When (−) power is not supplied, almost all types of data are indicated faintly.
- Improper soldering of LCD·D IC pin No. (4), (36) or (59).



(2) R301 broken
- All the items are displayed when R301 is broken.

(3) Improper soldering of LCD·D IC leg No. 10
- All the items are displayed faintly when no input voltage is applied to IC leg No. 10.

(4) R305 broken or shorted
- All the items are apt to be displayed when R305 is broken or shorted.



(3) **Indication Unreliable (unnecessary items displayed)**

- Items more than necessary are displayed though all the items are not indicated.
- Indication unstable or varied upon mode switching.
- This type of trouble mostly traced to defective LCD·D circuit or LCD·D IC or LCD.
- When shutter (manual mode) operates abnormally in addition, CPU is defective.

- Preparations
  1. Measuring instruments: ○ Digital voltmeter or circuit tester
     ○ Synchroscope
  2. Mode: ○ AUTO or MANUAL (lens should be attached in position)
  3. Light LCD indicator.

- Do not set shutter dial at B or mecha. 1/60.

1. **Indication provided. All the other characters and symbols are indicated very faintly.**

- R301 shorted

2. **Indication provided. All the other characters and symbols are indicated faintly.**

- R302, R303 or R304 shorted
- R304 broken

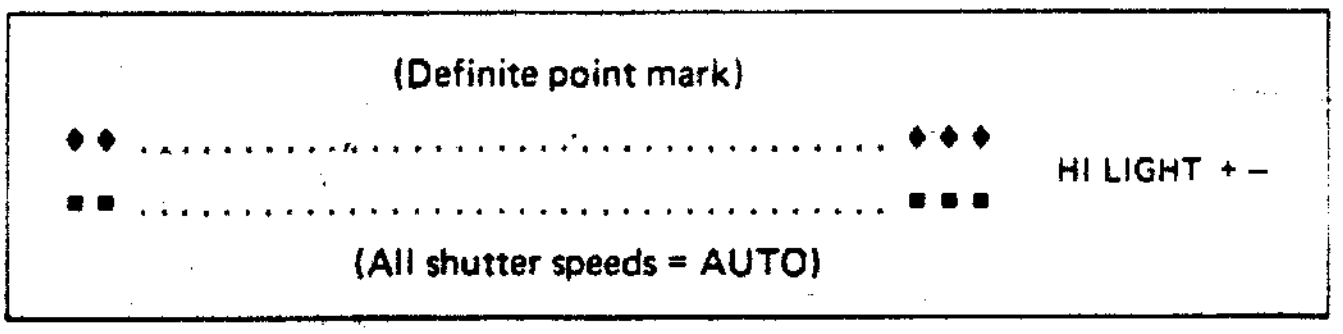
3. **Indication provided. All the other characters and symbols are indicated clearly.**

- R301, R302 or R303 broken

4. **Indication unreliable**

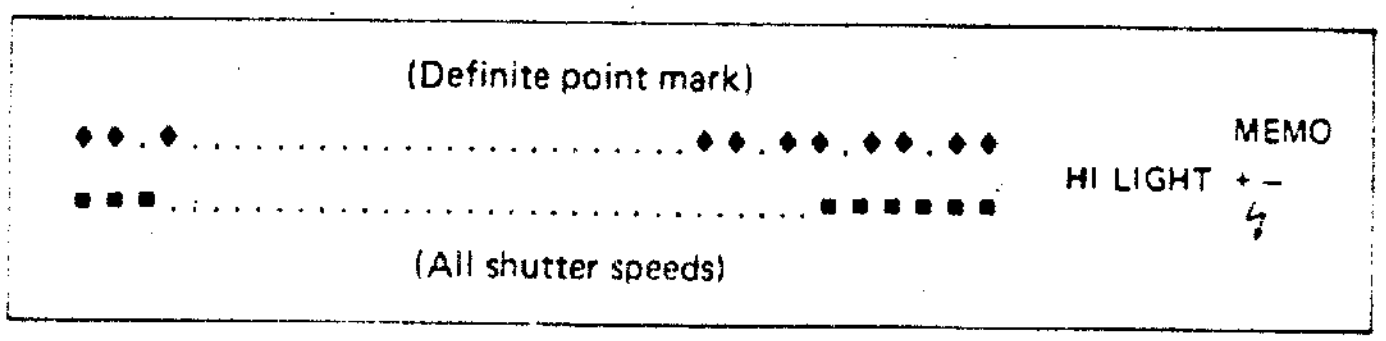
(1) **Resistors shorted to each other or broken**

(a) **R301 and R302 broken (soldering defective) = Improper soldering of IC leg No. 9**



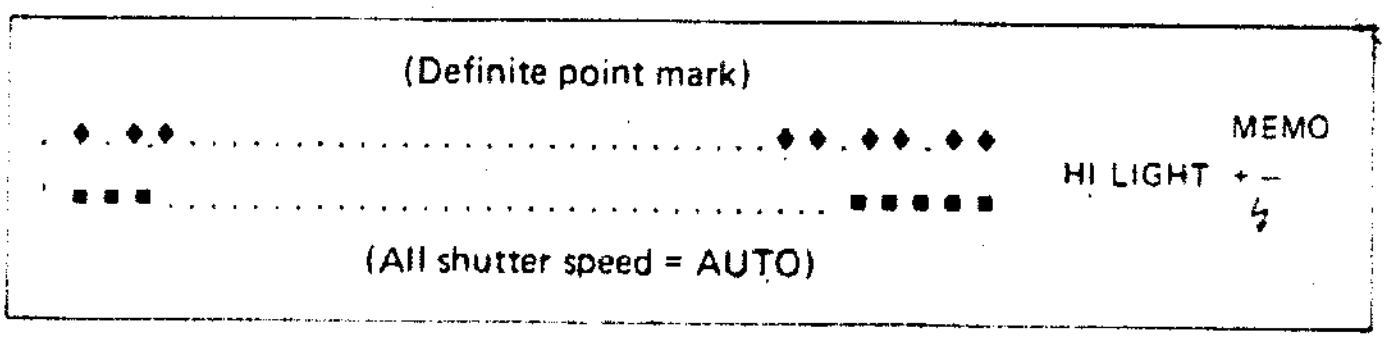
- Dot (♦) is indicated.
- HI LIGHT is indicated.

(b) R302 and R303 broken (soldering defective) = Improper soldering of IC leg No. 8



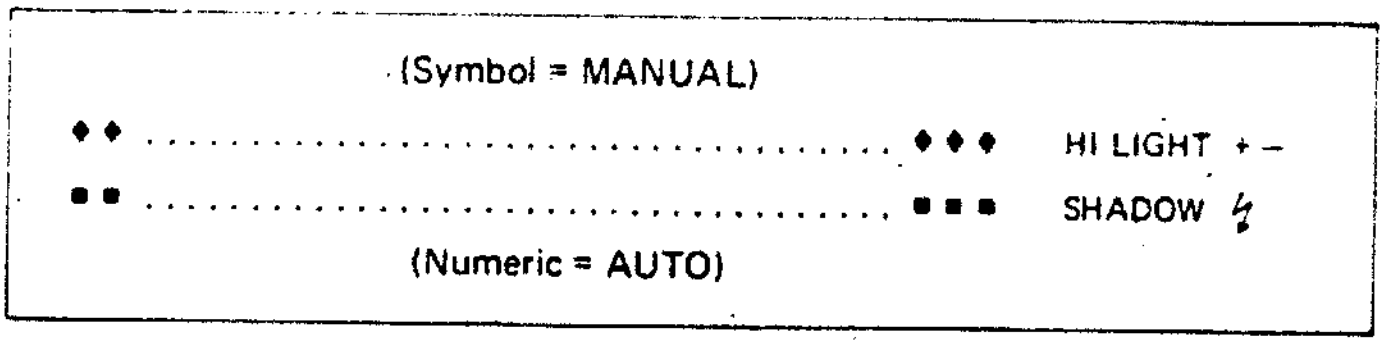
- All dots but every third one are indicated at the same time.
- HI LIGHT, MEMO, + – and ϟ are indicated faintly.

(c) R301, R302 and R303 broken



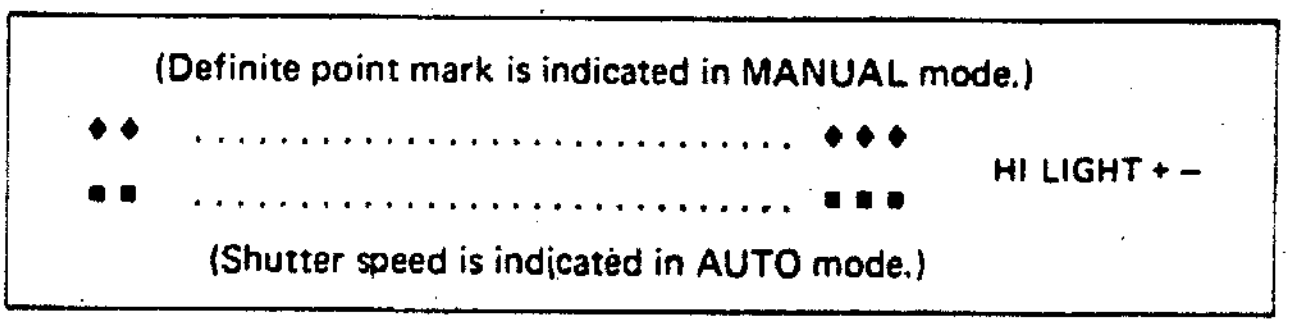
- All dots but every third one are indicated at the same time.
- HI LIGHT, MEMO, + – and ϟ are indicated.

or



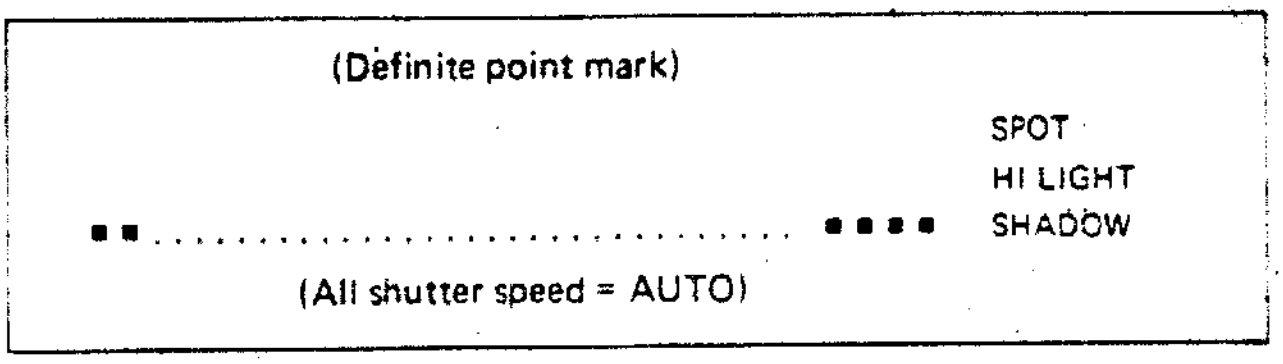
- Dot (♦) is indicated.
- HI LIGHT, + – are indicated.
- SHADOW and ϟ are indicated faintly.

(d) R303 and R304 broken (improper soldering) = Improper soldering of IC leg No. 7



- Dot is indicated.
- HI LIGHT is indicated.
- All items are indicated faintly.

(e) R302 and R304 broken (improper soldering)



- SPOT, HI LIGHT and SHADOW indicated rather clearly.
- All items are indicated faintly.

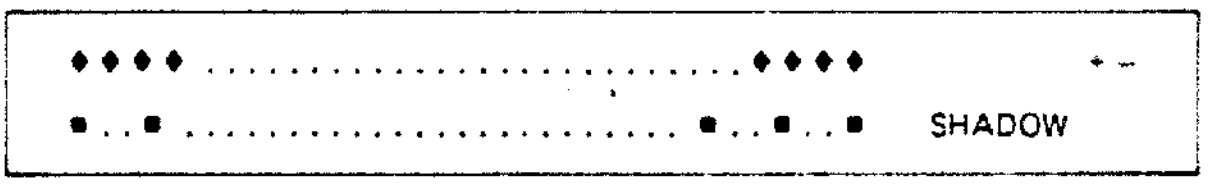
(f) R301 and R304 broken (improper soldering)

- All items are indicated.

(2) Power supply (−) shorted to resistor or broken

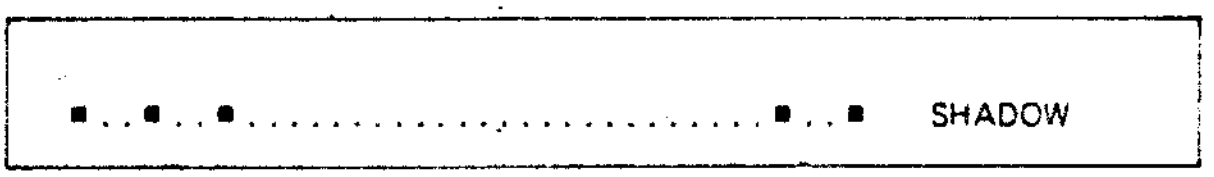
(a) Power supply (−) line and R301 broken (improper soldering)

1.



- All items are indicated faintly.
- Dot, bar, SHADOW, + − are indicated clearly.

2.



- All items are indicated faintly.
- Bar and SHADOW only indicated clearly.

3. Normal operation in AUTO and MANUAL modes
   - Necessary items are dark and not clear.
   - All items are indicated faintly.

4. Indication variable upon mode switching
   - Indications are very dark.

(b) Power supply (−) and R302 broken or soldering defective

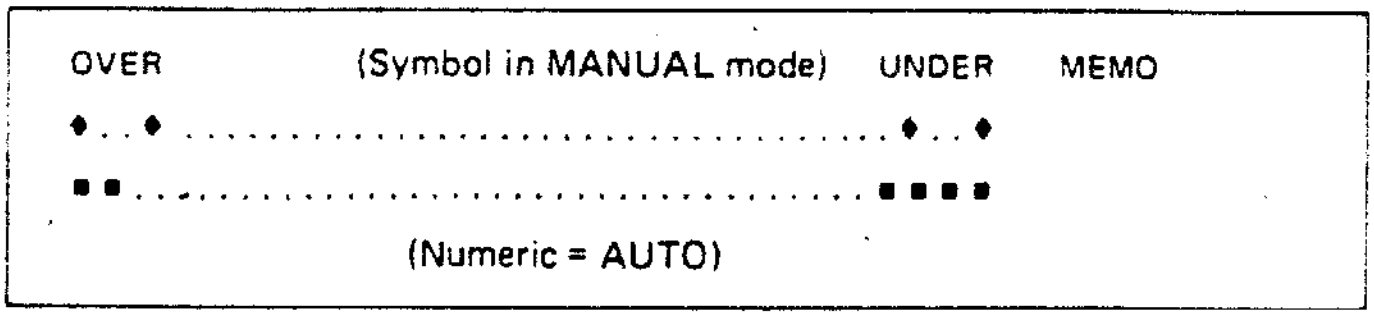
- Necessary items are indicated clearly.
- All the other items are indicated faintly.

(c) Power supply (−) and R303 broken or soldering defective

- Necessary items are indicated clearly.
- All the other items are indicated faintly.

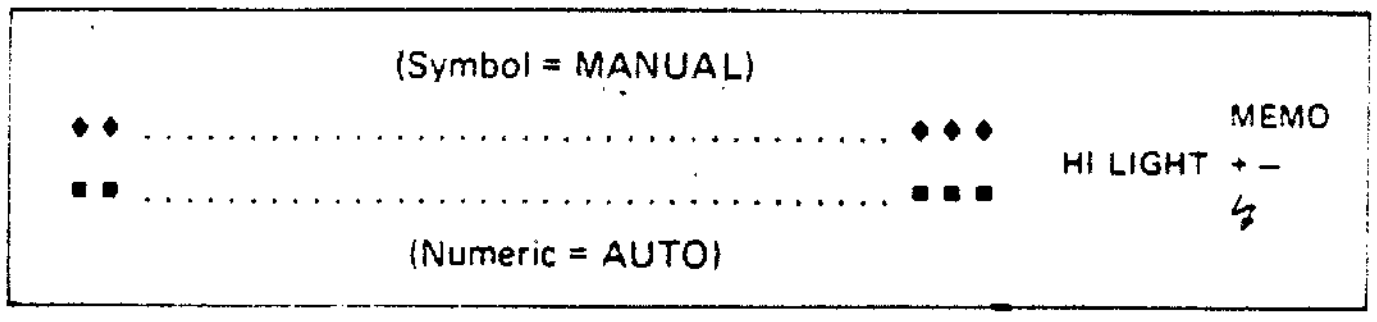
5. Examples of other symptoms

(1) R302 shorted and R304 broken



- OVER, UNDER and MEMO are indicated faintly.
- Dots (♦) are indicated at every third positions as shown above.

(2) R302 broken and other troubles



- Dot (♦) is indicated.
- +, – and ϟ are indicated.
- HI LIGHT and MEMO are indicated faintly.

6. **Improper soldering of LCD·D IC Leg**

(1) Improper soldering of IC leg No. 7

- Same symptom as that caused by broken R303 or R304

(2) Improper soldering of IC leg No. 8

- Same symptom as that caused by broken R302 or R303.

(3) Improper soldering of IC leg No. 9

- Same symptom as that caused by broken R301 or R302.

(4) Improper soldering of IC leg No. 10

- Indication normal
- However, necessary items are not so clear and all the other items are indicated faintly.

7. **Power supply (−) line broken**

- All items are indicated

or

- Necessary items are not clear and all the other items are indicated faintly.
- Indication faint and unreliable.

8. **LCD·D IC defective**

- IC is defective when LCD·D circuit is normal.

9. **LCD defective**

- Replace LCD.

(4) Some Items are Not Indicated (Too Faint)

- Lack of some indication items is traced to defective input stage or output stage (display side).
- Specific characters and symbols faint also in other modes (though visible)
- Defective input stage causes malfunction of shutter.
- Malfunction of output stage is traced to defective contact for LCD·D output and LCD.

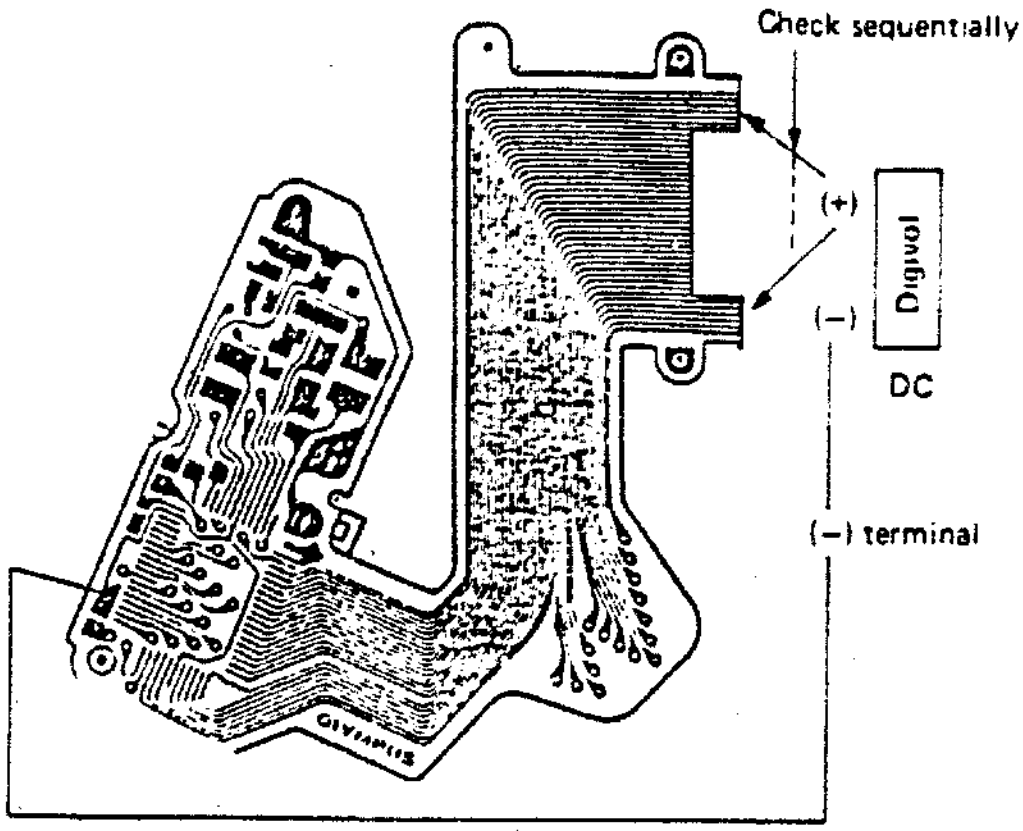
- Preparations
  1. Measuring instruments: Digital voltmeter
     Synchroscope
  2. Mode: AUTO or MANUAL (lens should be attached in position)

- Should be checked at a speed other than B. mecha. 1/60.

1. When shutter operates normally

- Output stage defective
- Lack of some indication items can be traced to defective IC or abnomal output from the IC (LCD·D circuit OK).

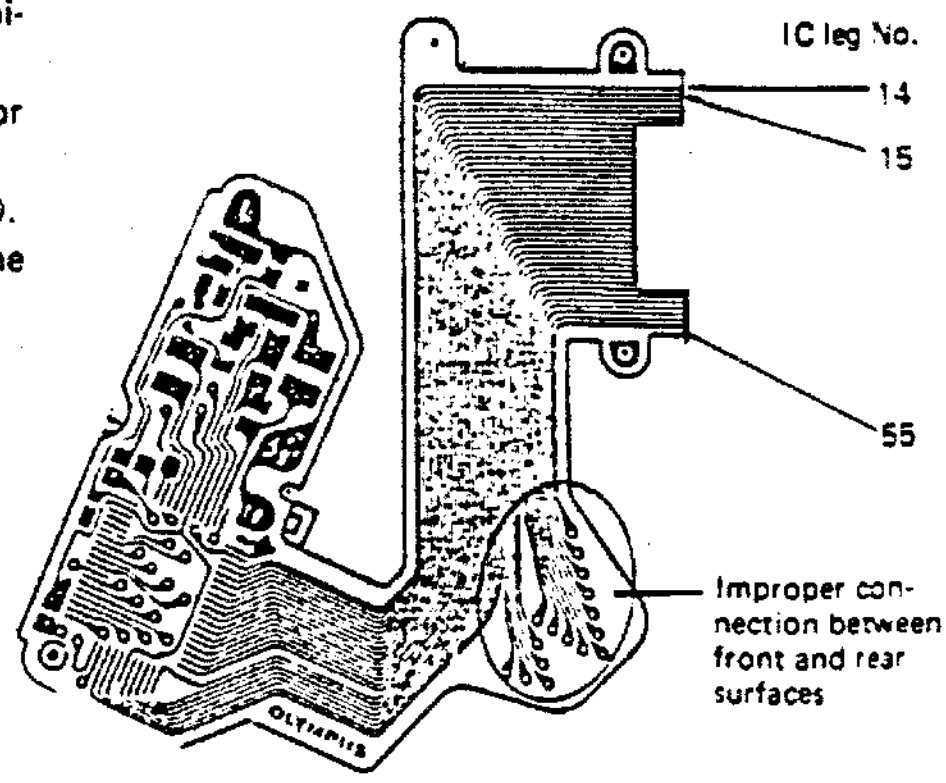
- Check output voltage from LCD·D.
  - Disconnect LCD.
  - Measure voltage on each terminal.
  - Normal voltage on each terminal
    DC 3.6 to 4.0 V



(a) When no voltage is provided to some terminal
   1. Improper soldering of LCD·D IC for that terminal.
   2. Pattern broken between IC leg and LCD.
   3. When 1 or 2 mentioned above is not the cause, LCD·D IC is defective.

- Resolder IC leg.
- Repair broken pattern.

- Indication items made faint by broken leg.



IC leg No.	Indication items (faded or lacked character and symbol)
14	+– HILIGHT ◆◆◆.....◆
15	ϟ SHADOW ■■■.....■
16	1 ~ 2000, ///// OVER, OVER +, |, | ▷|◁
	|, | –, UNDER, SPOT, MEMO
17	MEMO, +–, ϟ
18	SHADOW, HILIGHT, SPOT

Leg No.	Indication	Leg No.	Indication	Leg No.	Indication	Leg No.	Indication
19	1 sec.	29	|	39	► ◄	49	
20	UNDER	30		40	► 60 ◄	50	1000
21		31	15	41	125	51	+
22	2	32	|	42	►	52	
23		33		43		53	2000
24		34	30	44	250	54	OVER
25	4	35		45	|	55	///// OVER
26	–	36		46			
27		37	◄	47	500		
28	8	38	60	48	|		

(b) When outputs provided to all terminals
   1. Rubber connector defective ..... Replace
   2. LCD defective ..... Replace

2. Shutter operation abnormal

(1) No indication in MANUAL mode

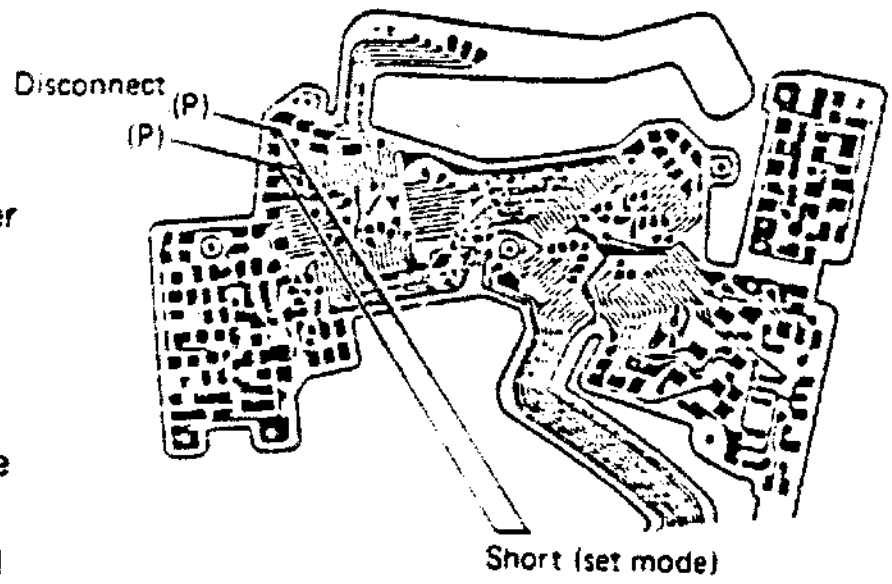
- Shutter inoperative

(a) Indication provided in MANUAL mode after disconnecting the following lead wire?

- Disconnect pink lead wire.
- Short the terminal with tweezers.

1. Indication provided in MANUAL mode
   - SV circuit board SW defective
   - (P) lead wire defective or desoldered

- Operates though abnormally



2. No indication in MANUAL mode
   Check the following items:
   - Pattern broken between (P) and CPU No. 13
   - Pattern broken between (P) and CPU No. 19
   - Improper soldering of CPU leg No. 13 or 19

(b) HA and HB signal provided?
CPU No. 55 → H = 3 V
CPU No. 56 → H = 3 V

When HA and HB not provided

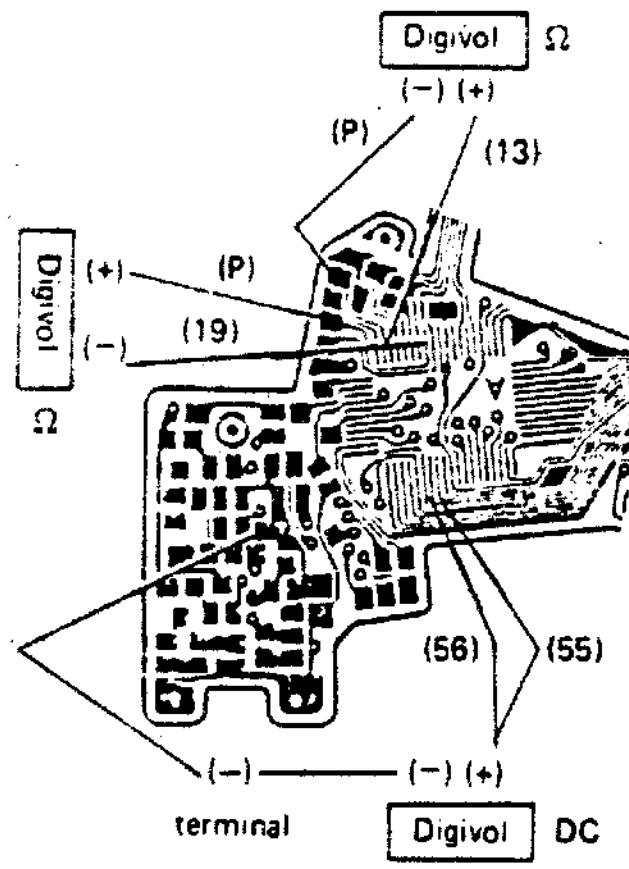
↓

CPU IC defective

When HA and HB provided

↓

Indication obtainable.



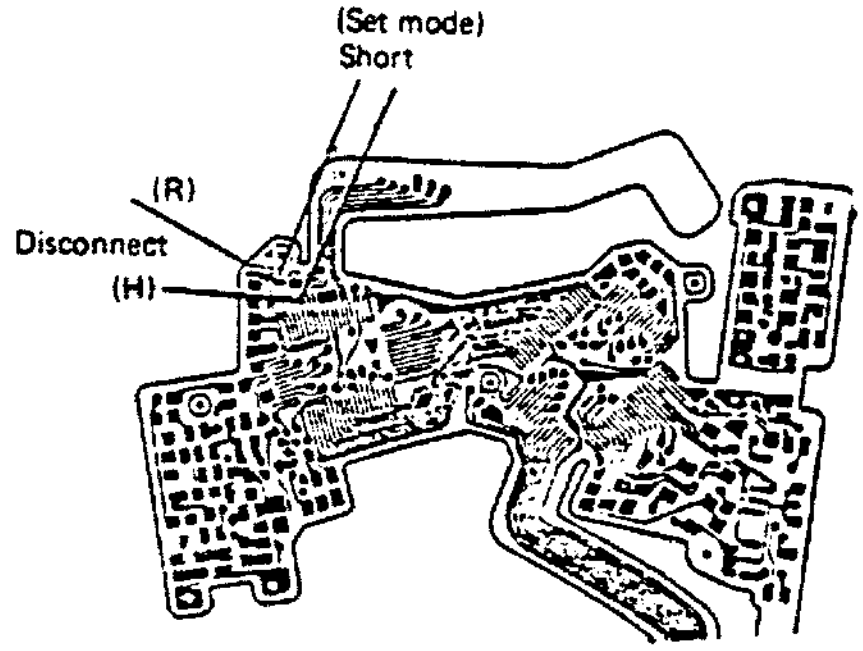
(2) SPOT not indicated

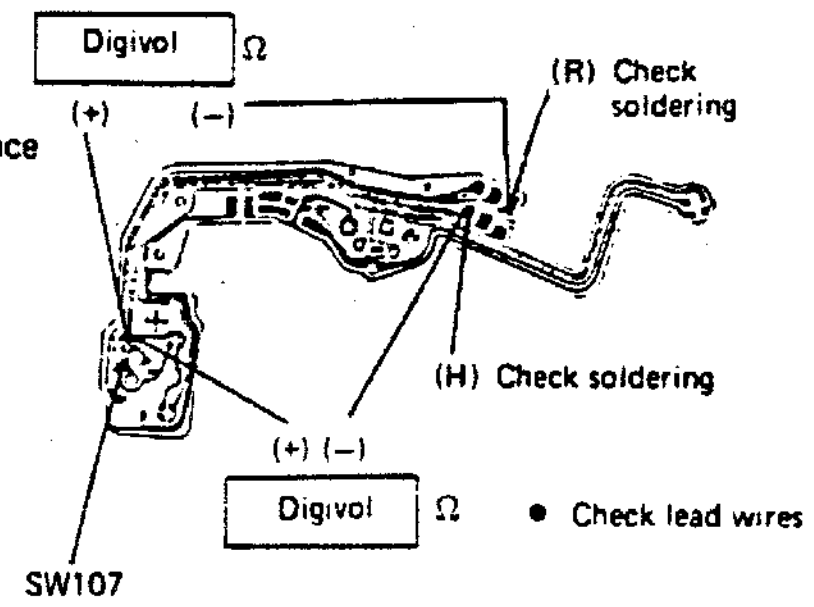
- Indication normal in MANUAL and AUTO modes.
- SPOT not indicated and shutter operates abnormally (average exposure) in SPOT mode.

(a) Indication obtained after detaching top cover?

- Disconnect gray and red lead wires from top cover.
- Short terminals with tweezers.

1. When SPOT is indicated
   Check the following items
   - Wire breakage between top cover and M circuit board
   - U circuit board defective.
   - SW107 defective
   - For checking pattern measure resistance with a digital voltmeter (should be 0Ω).



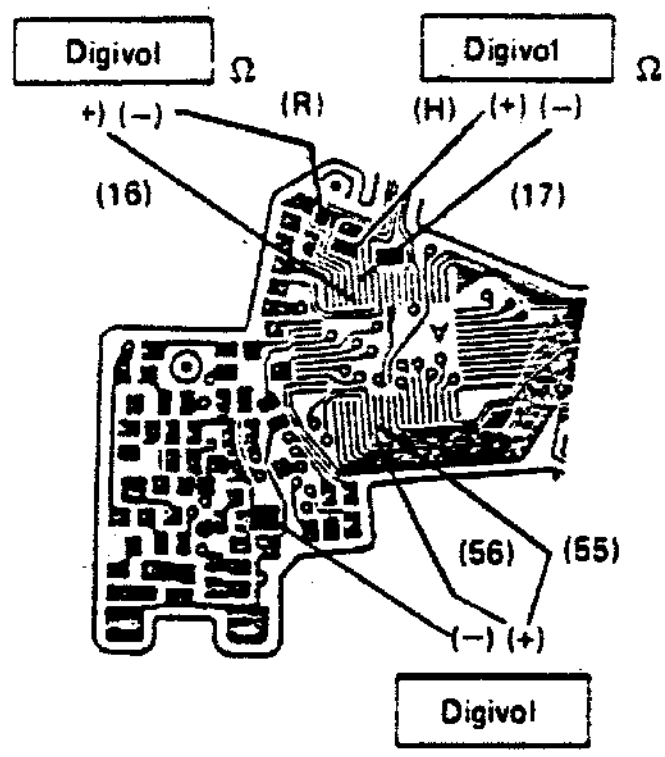


2. When SPOT is not indicated
   Check the following items
   - Pattern broken between (R) and No. 16
   - Pattern broken between (H) and No. 17
   - Defective soldering of CPU No. 16 and No. 17

(b) HA and HB signals provided
CPU No. 55 → L 0 V
CPU No. 56 → H 3 V

When HA or HB not provided
↓
CPU IC defective

When HA and HB provided
↓
Indication obtainable.



(3) HI LIGHT not indicated

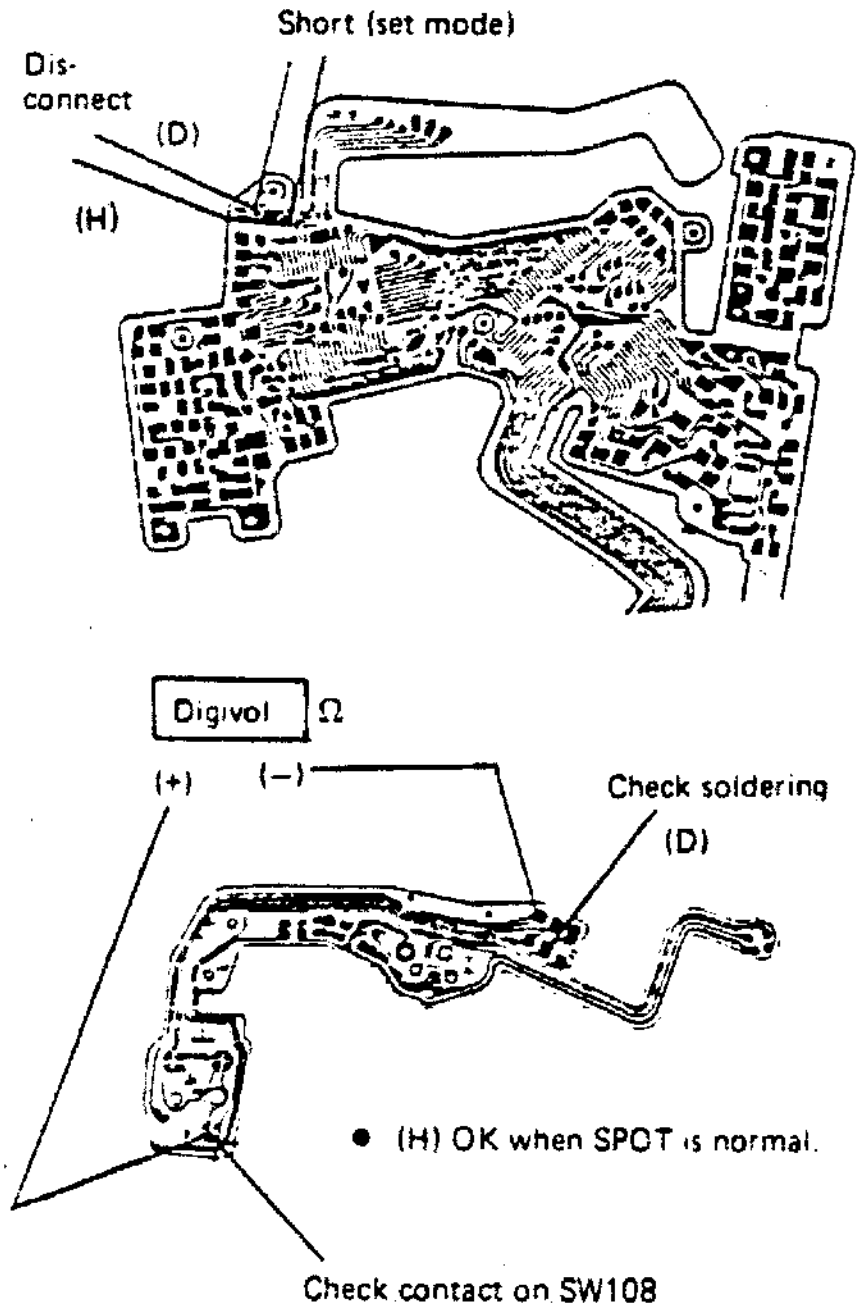
- Normal operation in SPOT mode
- HI LIGHT not indicated, bar indication immovable and shutter speed invariable

(a) HI LIGHT indicated after detaching top cover?

- Disconnect orange and gray lead wires from top cover.
- Short terminals with tweezers.
  (SPOT should be kept indicated.)

1. When HI LIGHT is indicated
   Check the following items
   - Wire breakage between top plate and M circuit board
   - U circuit board
   - SW108

- For checking pattern, measure resistance with a digital voltmeter (should be 0Ω).

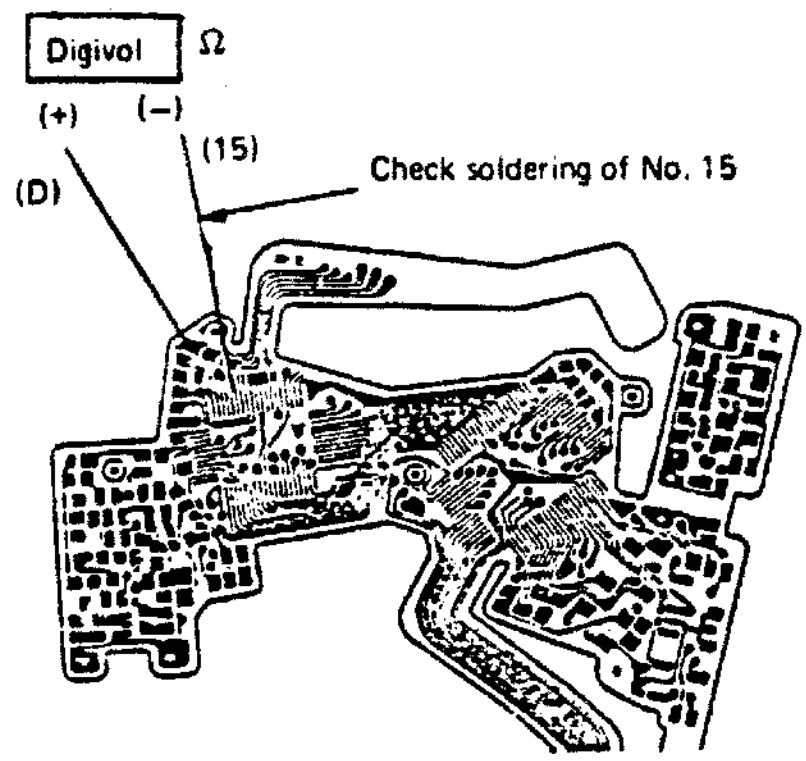


2. When HI LIGHT is not indicated
   Check the following items.
   - Pattern breakage between (D) and No. 15
   - Soldering of CPU No. 15

(b) When indication is still abnormal

↓

CPU IC defective



3. SHADOW not indicated

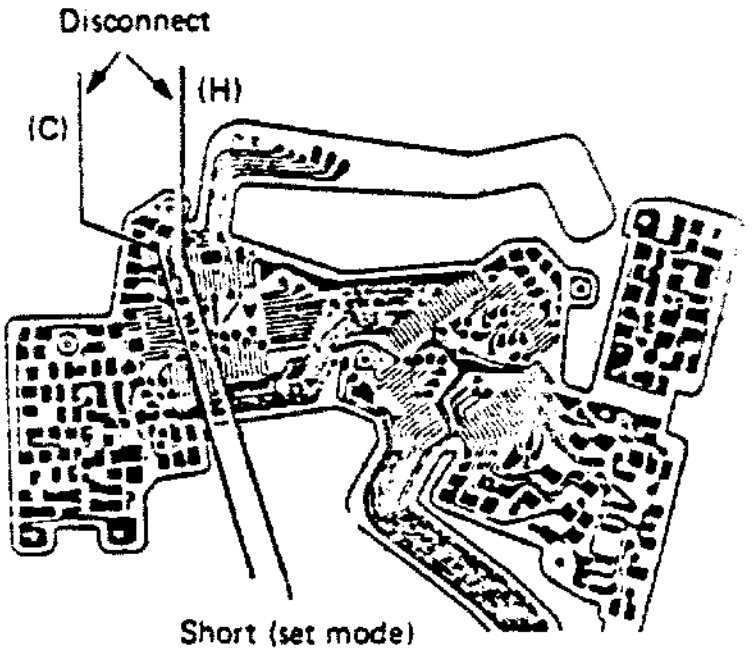
- Normal operation in SPOT mode
- SHADOW not indicated, bar indication immovable and shutter speed invariable

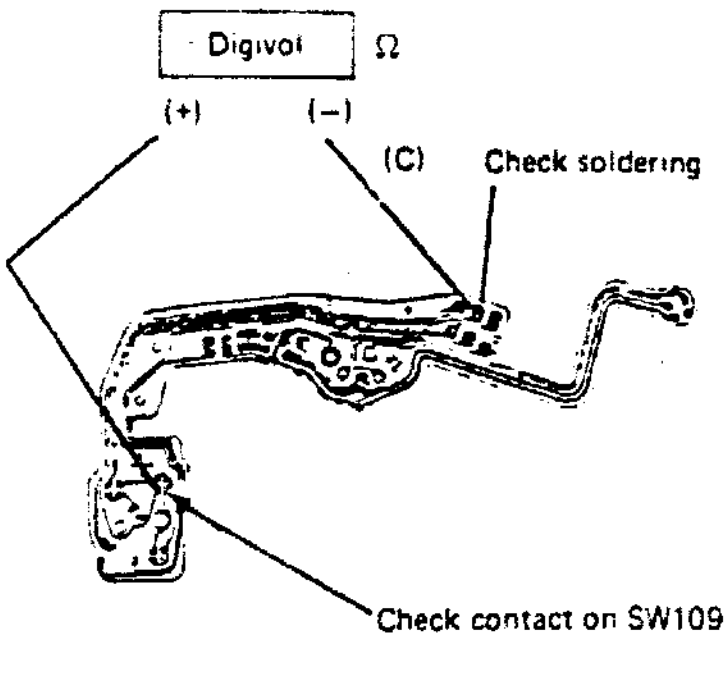
(a) SHADOW indicated after detaching top cover?

- Disconnect brown and gray lead wires from top cover.
- Short terminals with tweezers.
  (SPOT should be kept indicated.)

1. When SHADOW is indicated
   Check the following items
   - Wire breakage between top cover and M circuit board
   - U circuit board
   - SW109

- For checking pattern measure resistance with a digital voltmeter (should be 0Ω).





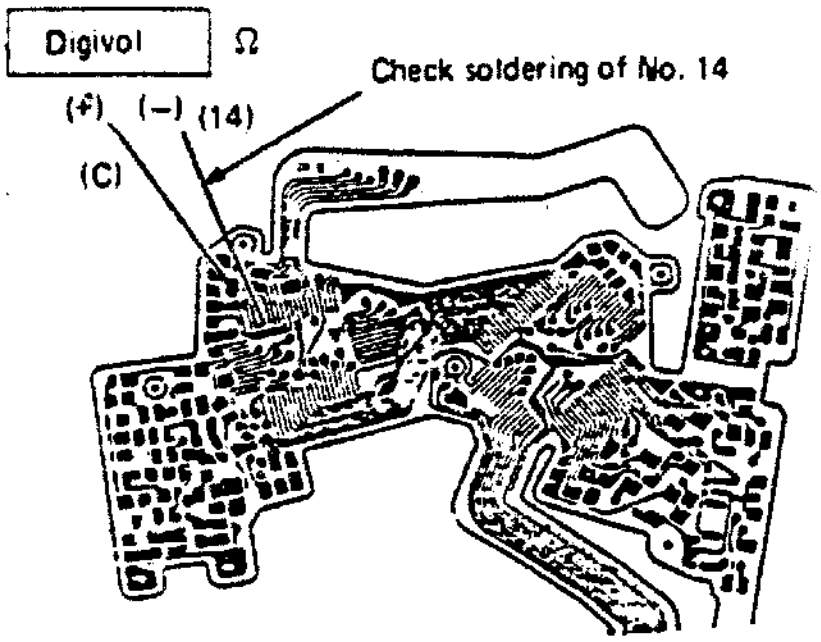
- (H) OK when SPOT is normal

2. When SHADOW is not indicated
   Check the following items
   - Pattern breakage between (C) and No. 14
   - Soldering of CPU No. 14

(b) When indication is still abnormal

↓

CPU IC defective



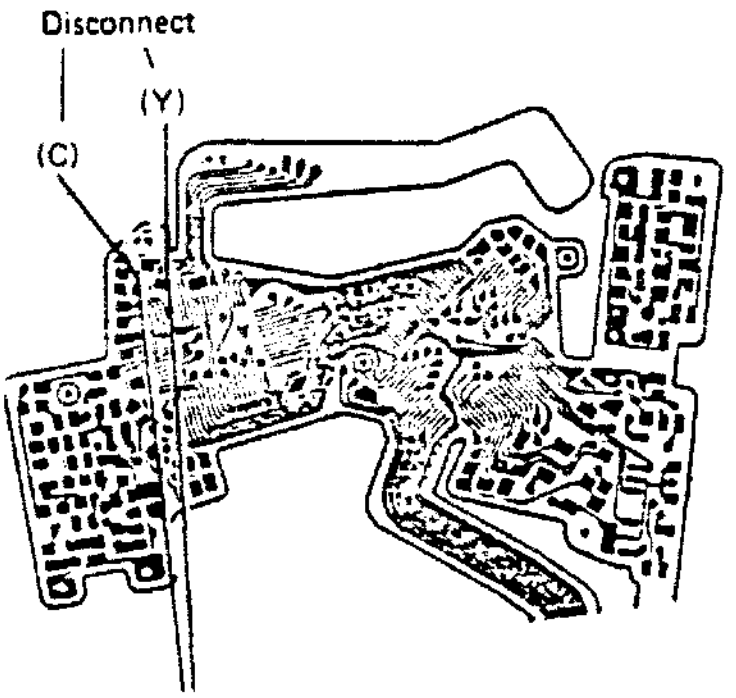
(4) MEMO not indicated

- Shutter operation normal
- MEMO is not stored when it is set and held.

(a) MEMO indicated after detaching top cover?

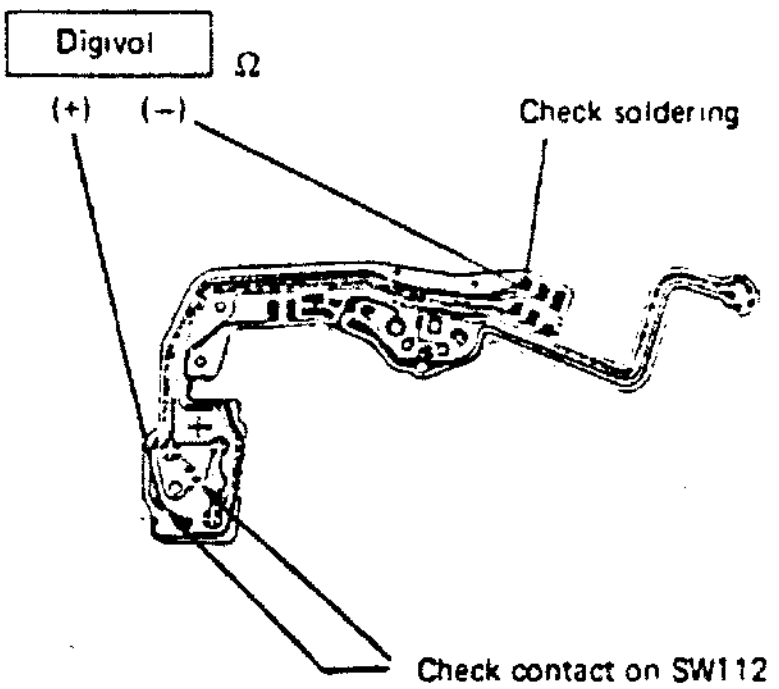
- Disconnect brown and yellow lead wires from top cover.
- Short terminals by using tweezers.

1. When MEMO is indicated
   Check the following items
   - Wire breakage between top cover and M circuit board
   - U circuit board defective
   - SW112
   - For checking pattern, measure resistance with a digital voltmeter (should be 0Ω).



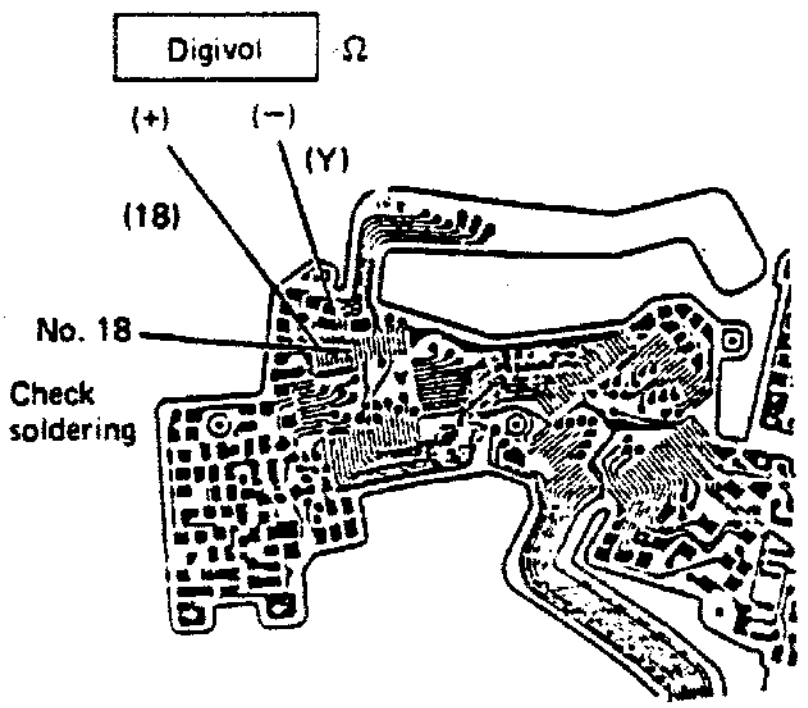
Short (set mode)

2. When MEMO is not indicated
   Check as follows:
   - CLR performed?
   - When CLR is not performed, check pattern for breakage between (Y) and No. 18.



(b) When CLR is normal → CPU IC defective

Note: When SHADOW is not indicated, check pattern for breakage between (C) and No. 14.



(5) Flash OVER/UNDER not indicated

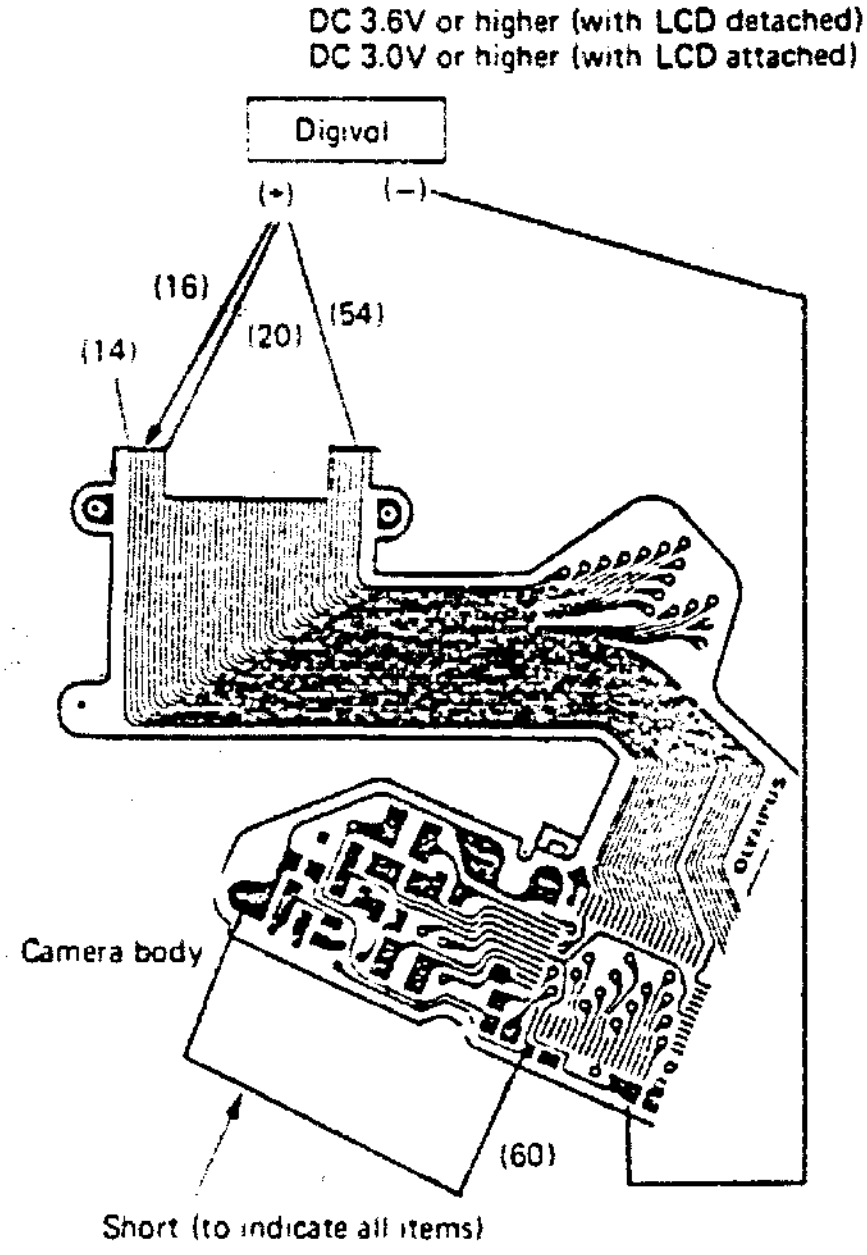
- Normal operation in AUTO mode
- Flash operates normally.
- Set camera in AUTO mode and attach flash in position.
- Set flash in OVER and UNDER condition. Check.

(a) Indication circuit OK?

- Check LCD for its normal operation.
  Apply positive voltage to LCD·D No. 60.
  OK when all items are indicated.

- Check LCD·D for its normal operation.
  OK when all the other items are indicated normally.

- Check LCD·D IC leg and pattern for detect or breakage.
  Output provided to IC No. 16, No. 20 and No. 54?
  DC 3.6 V or higher: OK
  3 V or higher with LCD attached: OK



- When indication circuit OK

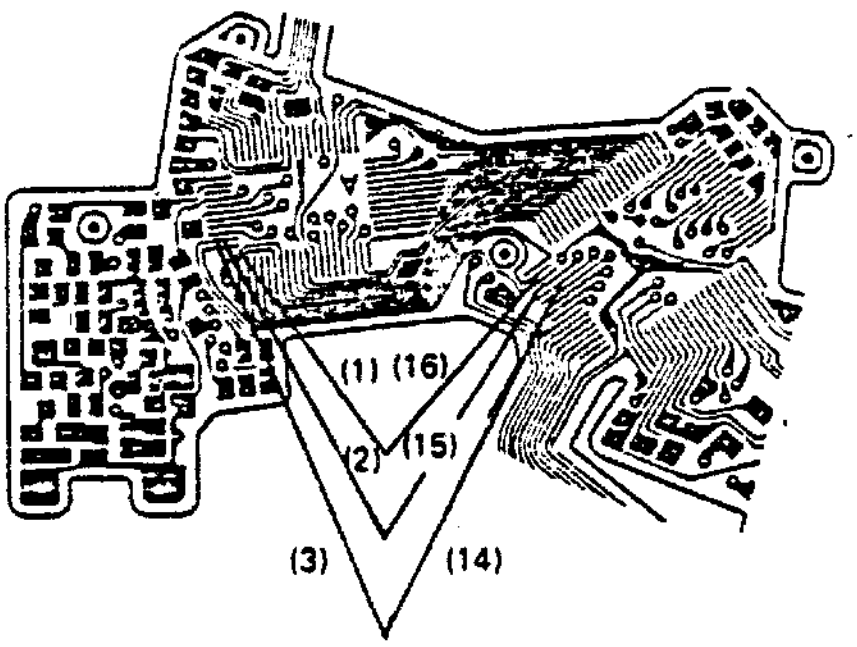
(b) Check whether or not B.C. system can operate normally and PCV sound is switchable from 2 kHz to 4 kHz in SELF mode.

1. When B.C. mode cannot be set and PCV sound is not switchable in SELF mode.
   - CPU leg No. 1, 2 or 3 defective or pattern broken.

2. When B.C. normal and PCV sound normal in SELF mode.

   ↓

   CPU or bipolar IC defective



Check continuity

(6) OVER exposure (shutter time) not indicated

- EE accuracy satisfies standard.
- Normal operation in MANUAL and AUTO modes.

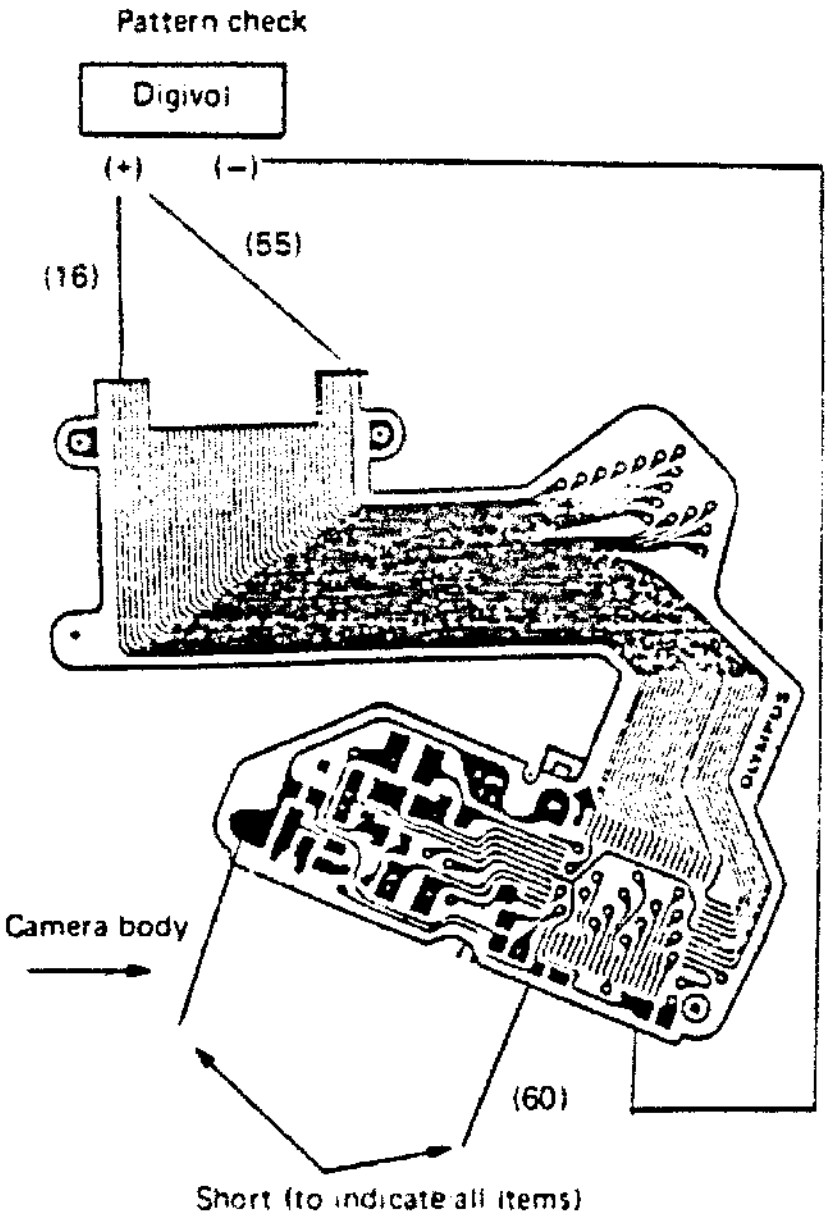
- Indication circuit normal?

  - Check whether or not LCD is normal.
    Apply positive voltage to LCD·D No. 60.
    OK when all items are indicated.

  - LCD·D normal?
    OK when other two or three items are indicated.

  - Check LCD·D IC leg and pattern for defect and breakage.
    Output provided to IC pins No. 16 and No. 55?
    At least 3.6 V
    At least 3 V with LCD attached in position

- When indication circuit OK
  → CPU IC defective



(5) **Bar Indication Not Provided**

- Bar indication fixed on low luminance side.
- When shutter operates normally (accuracy satisfies standard) in AUTO and MANUAL modes, indication circuit is defective.

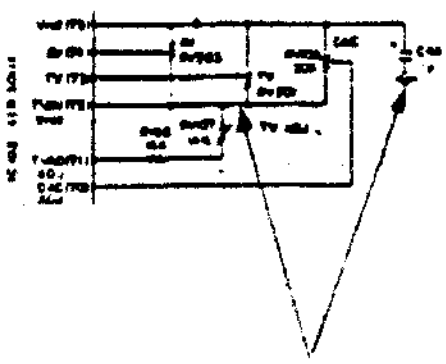
- Preparations
  1. Measuring instruments: : Digital voltmeter or circuit tester
     : Synchro scope
  2. Mode: : AUTO or MANUAL (lens should be attached in position)
  3. LCD should be kept indicated.

- Shutter dial must not be set at B or mecha. 1/60.

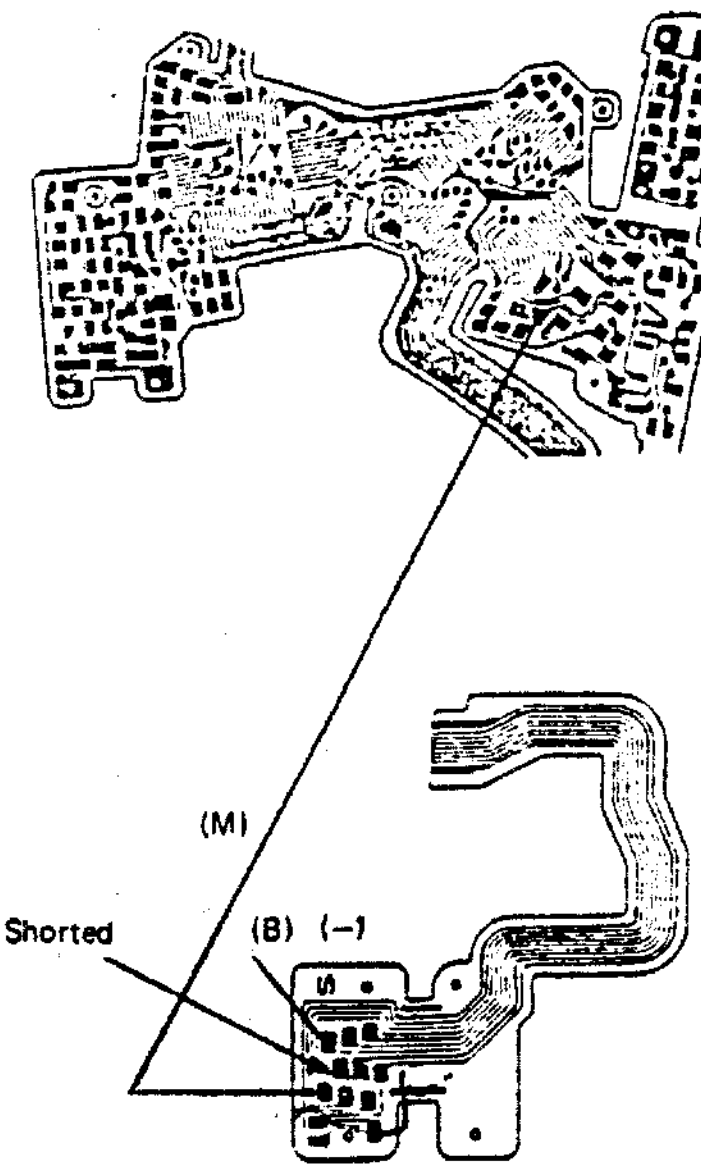
- When shutter operates also abnormally

1. TV AV circuit defective

- TV AV lead wire (purple) shorted to (–) terminal.
- TV value fixed at 1/2000.
- When indication is provided after disconnecting lead wire, lead wire (purple) shorted.



Shorted



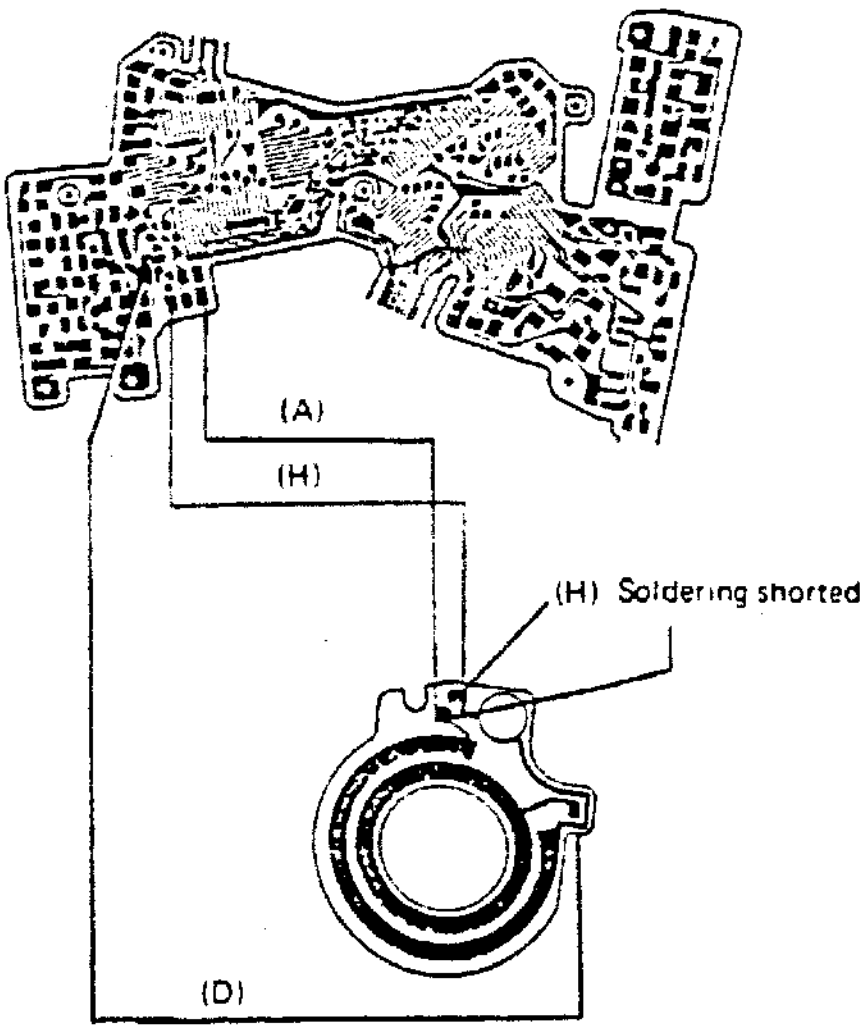
2. CV SV circuit defective

(1) Gray lead wire shorted to blue lead wire
- Check soldering

(2) CV lead wire (gray) shorted to (–) terminal

(3) EE adj. 2 lead wire (blue) shorted to (–) terminal.
- Disconnect each lead wire.
  When indication obtained, the lead wire is shorted.
- (2) and (3) above are rather rare.

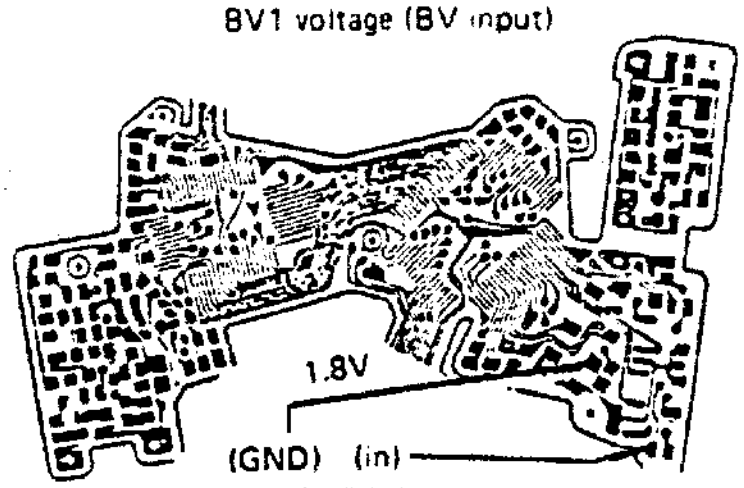
Shorting between gray and blue lead wires



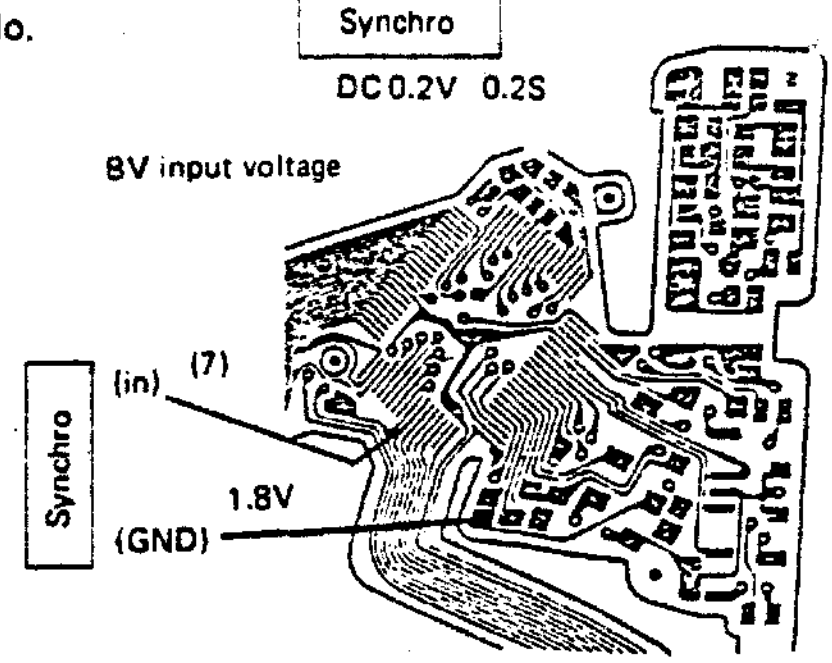
3. BV input provided?

- For simple check, measure BV voltage.
  It should normally be within a range of –200 to 100 mV.
- When input voltage is not provided, check voltage on pin No. 7 of bipolar IC.
- When no input voltage is not applied to IC pin No. 7.
  Head amplifier or related part defective
  See page E-151.
- When input voltage is applied to IC pin No. 7
  BV level converter circuit defective.
  See next page.

BV1 voltage (BV input)

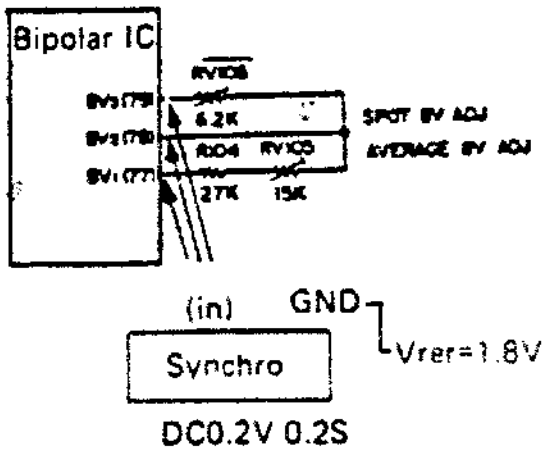


BV input voltage

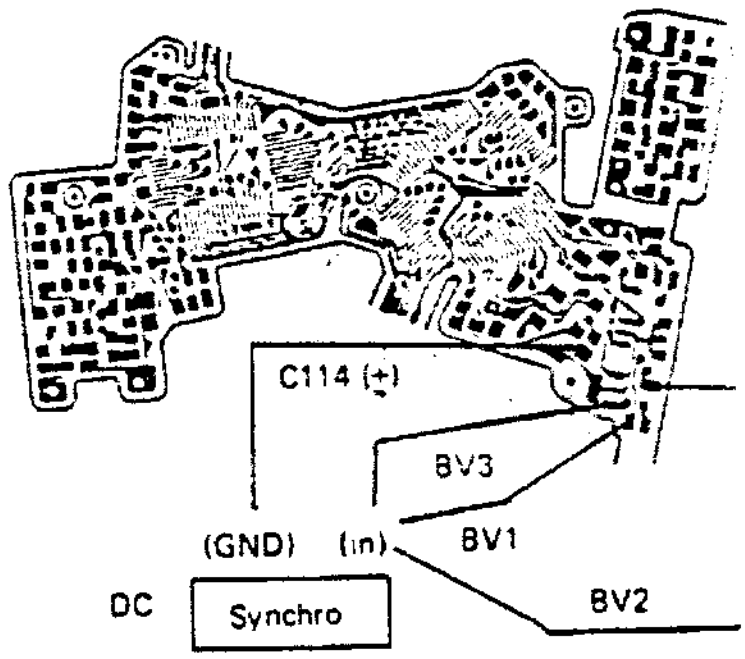


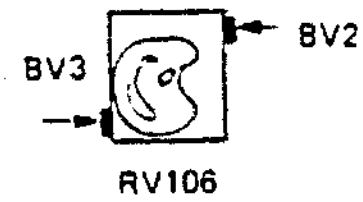
4. BV level converter circuit defective

- When BV input voltage is provided from head amplifier



Check of each BV voltage





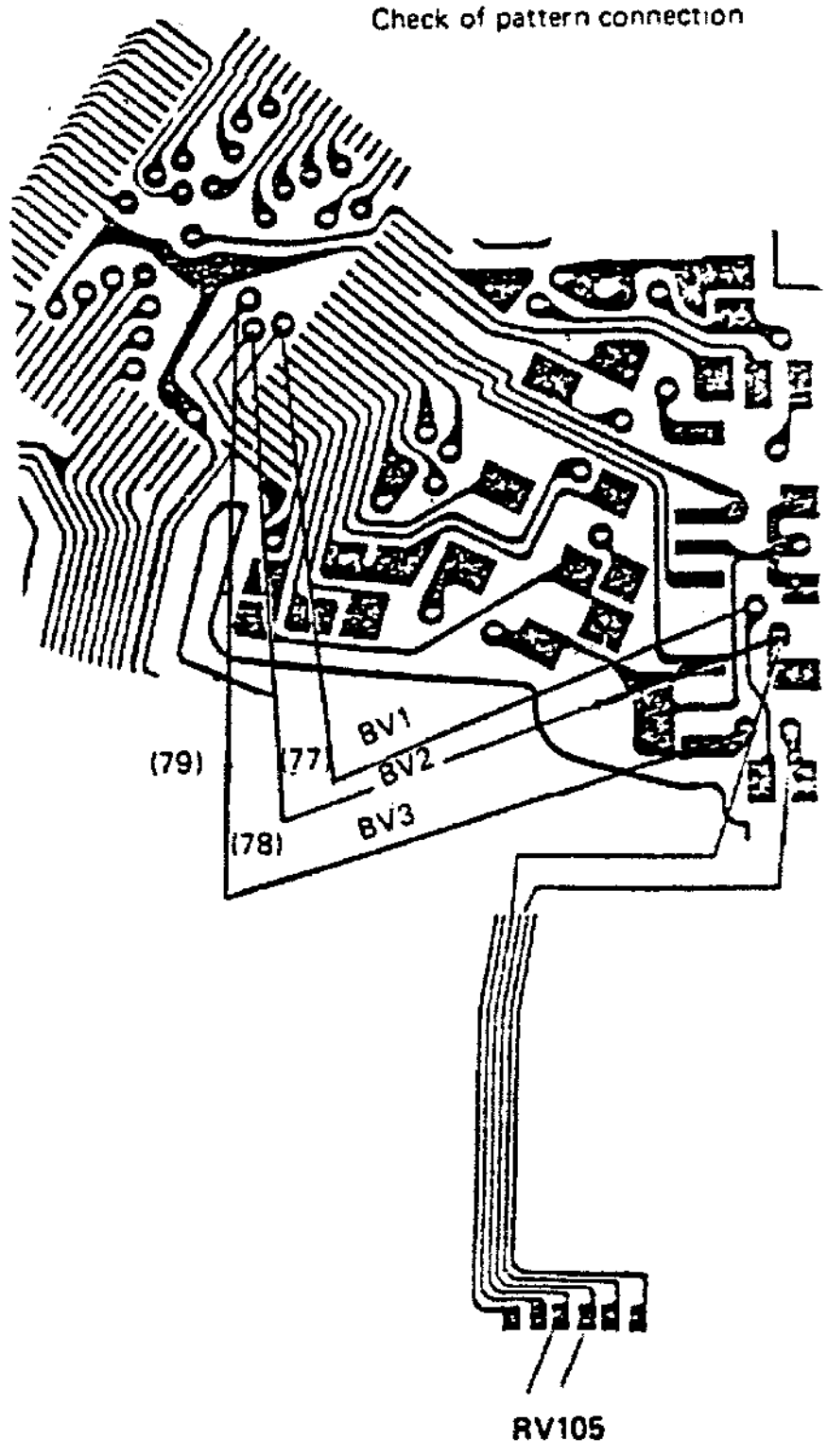
(a) BV1 output provided?
- Vref standard voltage
  −200 to −100 mV: OK
  (BV output voltage is not provided from head amplifier, when BV1 input voltage is −200 mV and invariable depending on brightness.)

(b) BV2 output voltage provided?
- Vref standard voltage
  +30 to +170 mV

(c) BV3 output voltage provided?
- Vref standard voltage
  +30 to +170 mV

(1) When each BV voltage is not provided
- Check RV105.
- Check RV106.
- Check IC leg and pattern of RV106.
- Check IC leg.

Check of pattern connection

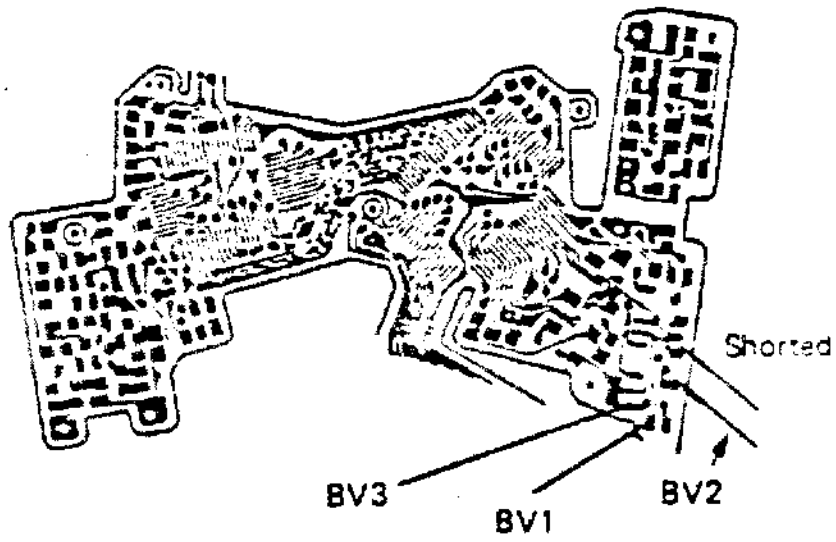


(2) BV2 shorted to (−) terminal
- Check soldering.

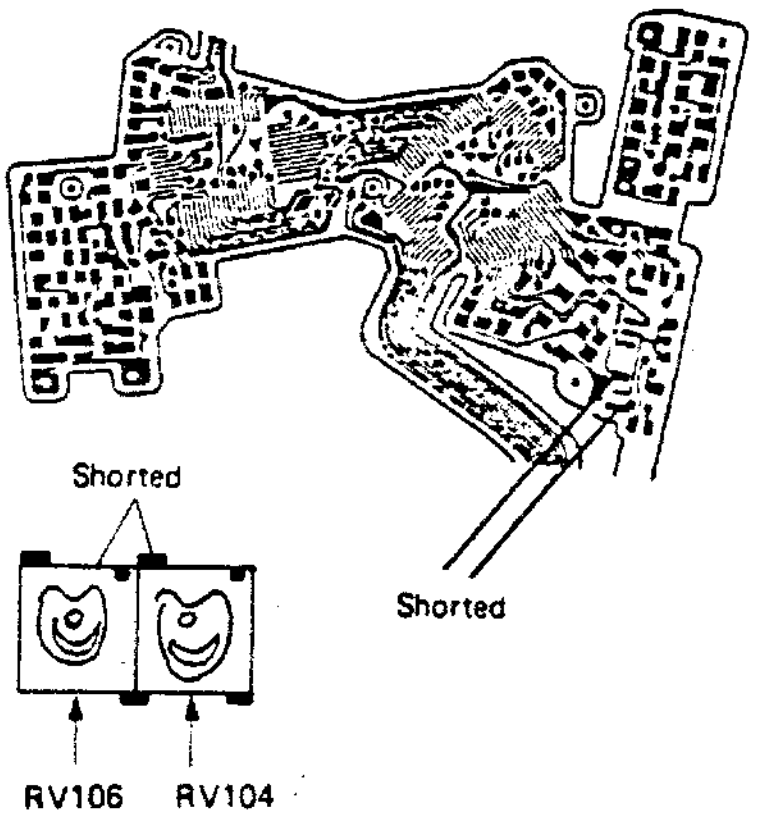
(3) BV1 shorted to 1.8 V line
BV3 shorted to 1.8 V line
These troubles occurs rarely.

(4) BV3 shorted to RV104
- Soldering shorted between Iref adjusting resistor RV104 and SPOT BV adjusting resistor RV106.

Check of each BV shorting



RV104 shorted to RV106



(6) Bar Indication Always OVER

- Bar indication cannot be lower than OVER indication.
- When shutter operates normally in AUTO and MANUAL modes, indicator circuit is defective.

- Preparations
  1. Measuring instruments: : Digital voltmeter or circuit tester
     : Synchroscope
  2. Mode: : AUTO or MANUAL (lens should be attached in position)
  3. LCD should be lit in viewfinder.

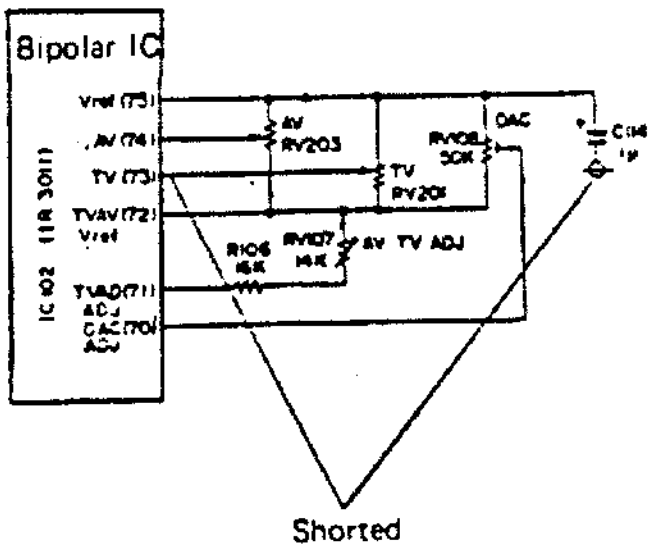
- Shutter dial must not be set at B. mecha. 1/60.

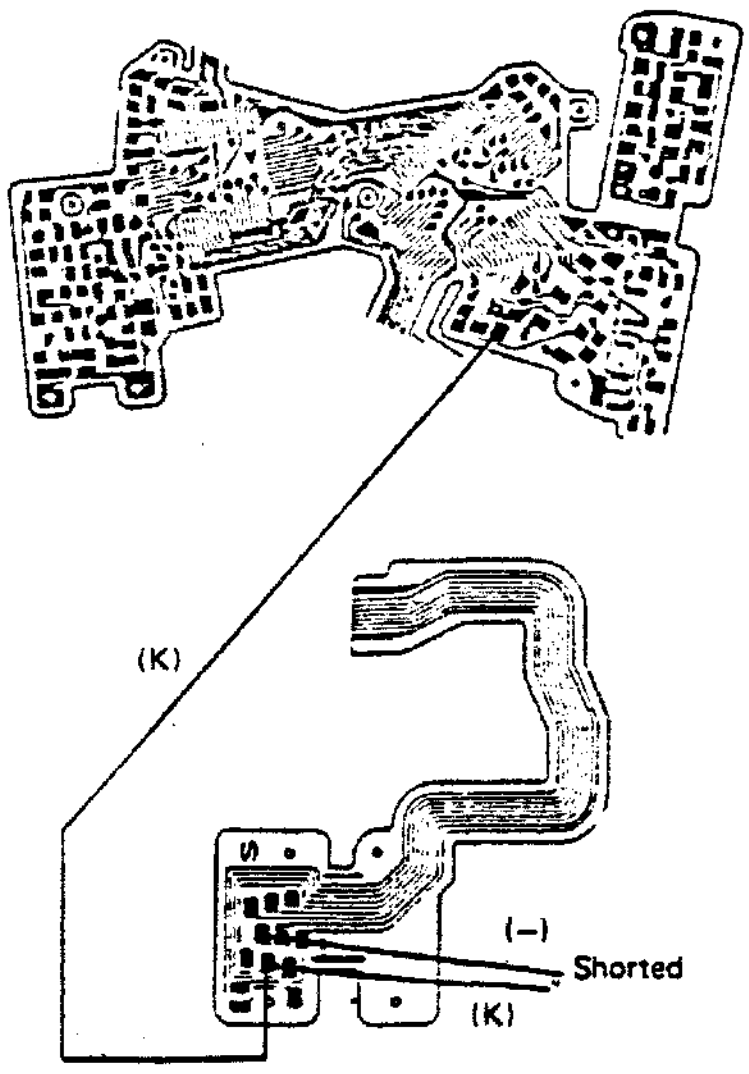
1. Shutter speed normal in both AUTO and MANUAL modes.

- In this case, indicator circuit (LCD·D or LCD) is defective.
  Check indicator circuit.

(When shutter operation is abnormal)

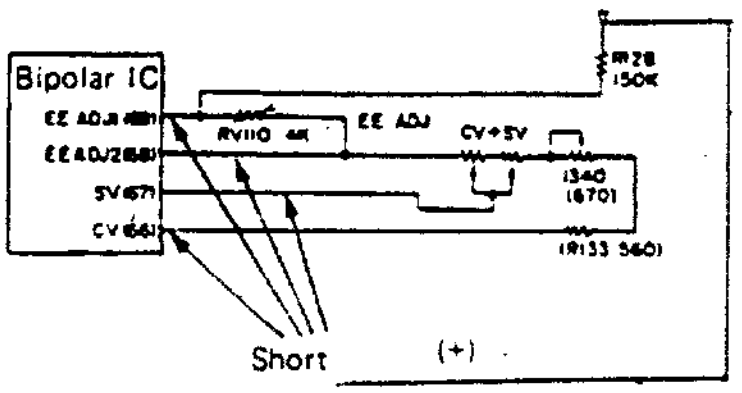
2. TV AV circuit defective

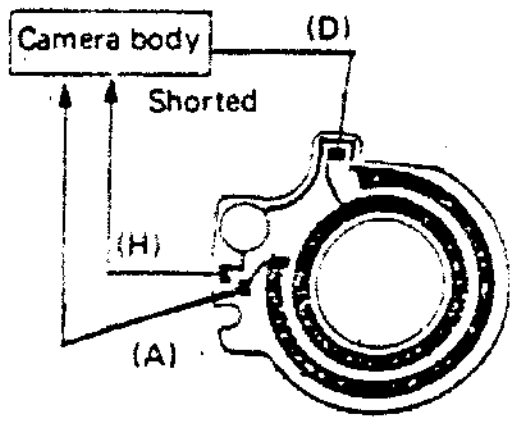




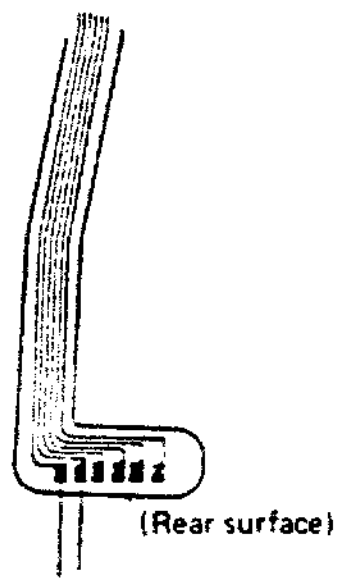
3. CV SV circuit defective

- Bar indication rather too high





- Lead wire compressed against top cover.

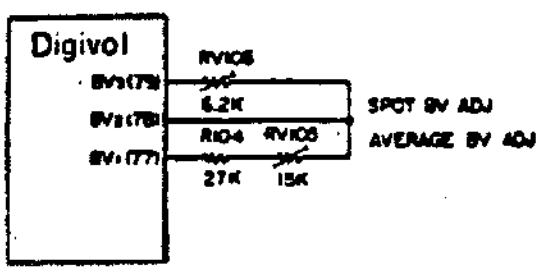


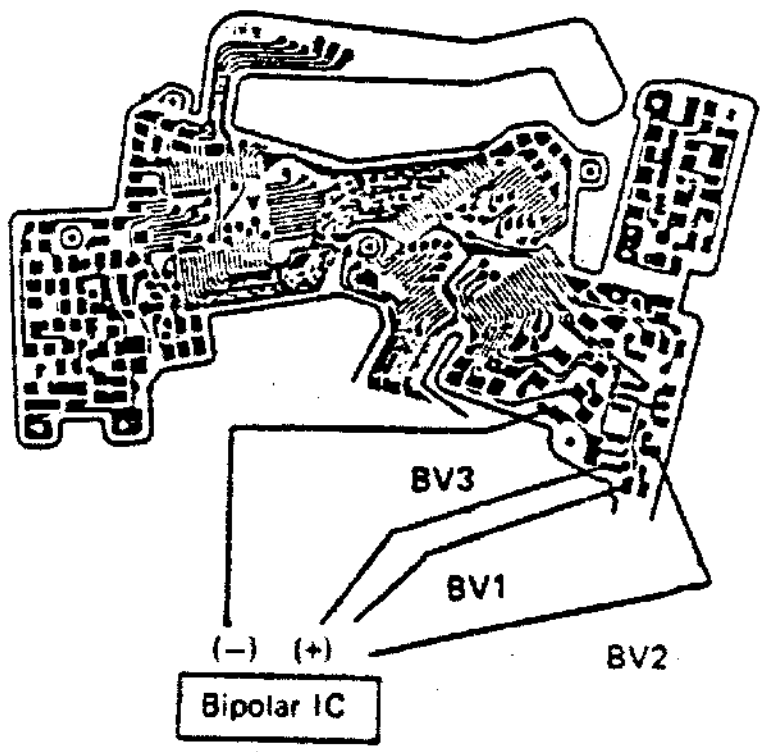
RV110 shorted to camera body

4. BV level converter circuit defective

- Bar indication made over by positive voltage applied to BV1, BV2 or BV3.
- Check each voltage. (+) 3 V indicates shorting between circuit and camera body.

- This trouble occurs rather rarely.

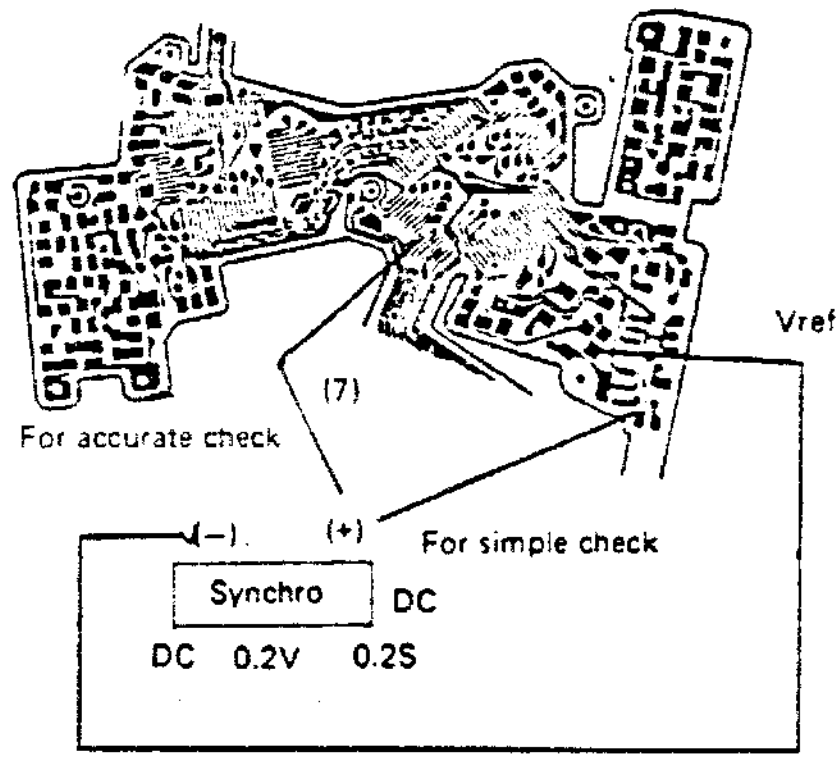




Voltage exceeding 2.3V indicates trouble.

5. BV output too high

- Measure BV input voltage. When it is 300 mV or more higher than Vref = 1.8 V, head amplifier or related part is defective.
- Check voltage with a synchroscope. (A digital voltmeter may be used though it provides unstable reading.)
- Head amplifier or related part defective
  See page E-151.
  (Head amplifier output abnormal)



(7) Bar Indication Uncharged with Data Input

- Bar indication is provided but invariable with data input.

- Preparations
  1. Measuring instruments: ⊃ Digital voltmeter or circuit tester
     ⊃ Synchroscope
  2. Mode: ⊃ AUTO or MANUAL (lens should be attached in position)
  3. LCD should be lit in viewfinder.

- Shutter dial must not be set at B or mecha. 1/60.

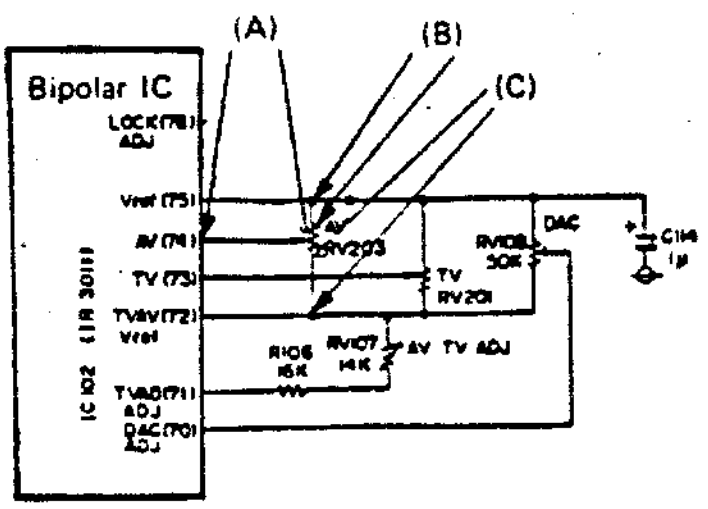
1. When shutter operation is normal (in AUTO and MANUAL modes)

- In this case, indicator circuit (LCD·D or LCD) is defective.
  Check indicator circuit.
- When indicator circuit and shutter are normal CPU IC defective.

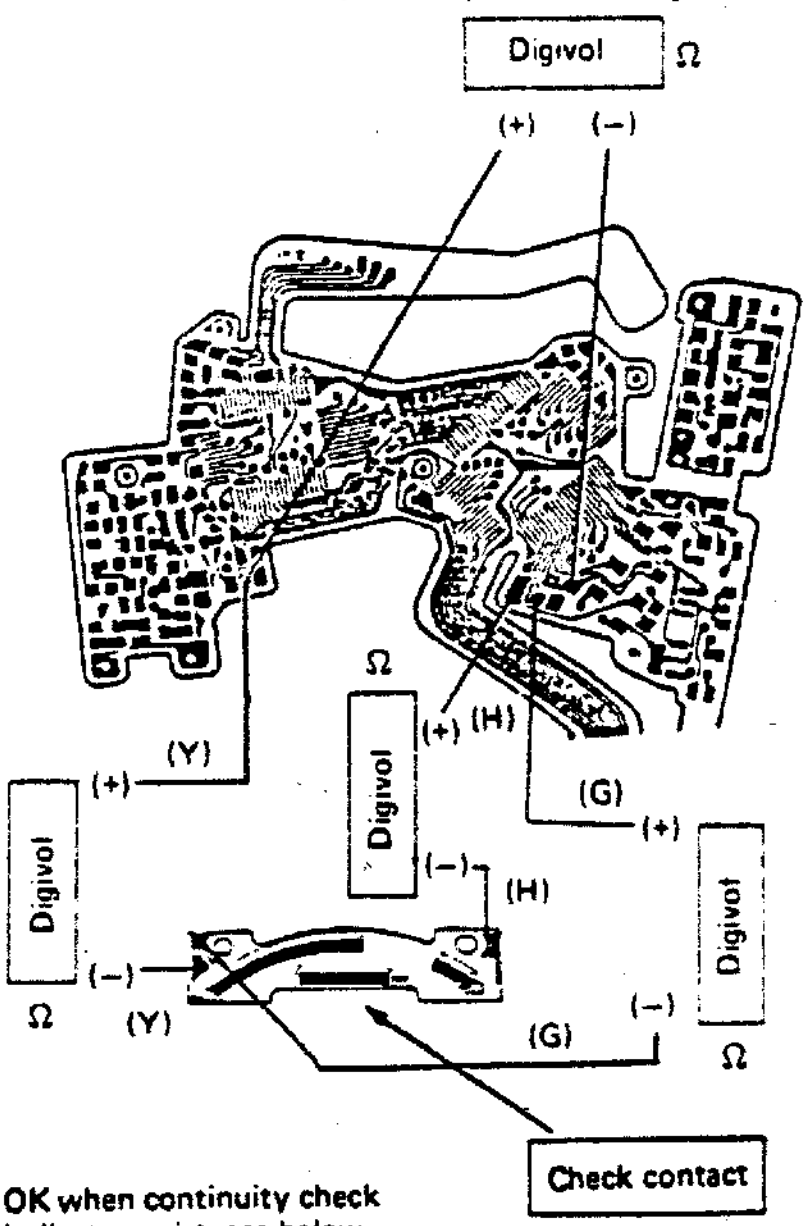
2. Bar Indication invariable with F stop ring only

(1) When shutter operates normally, indicator circuit is defective.

(2) When auto EE adjustment is abnormal
- Data input circuit defective
- Check continuity of (A), (B) and (C) respectively.



- Check of pattern breakage

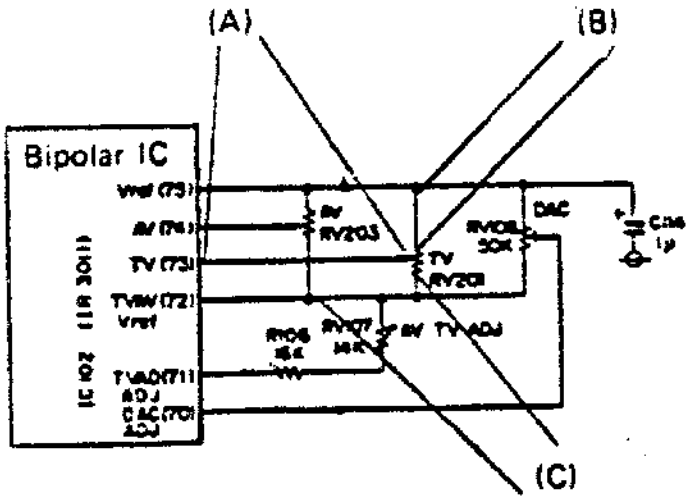


OK when continuity check indicates resistance below several ohms.

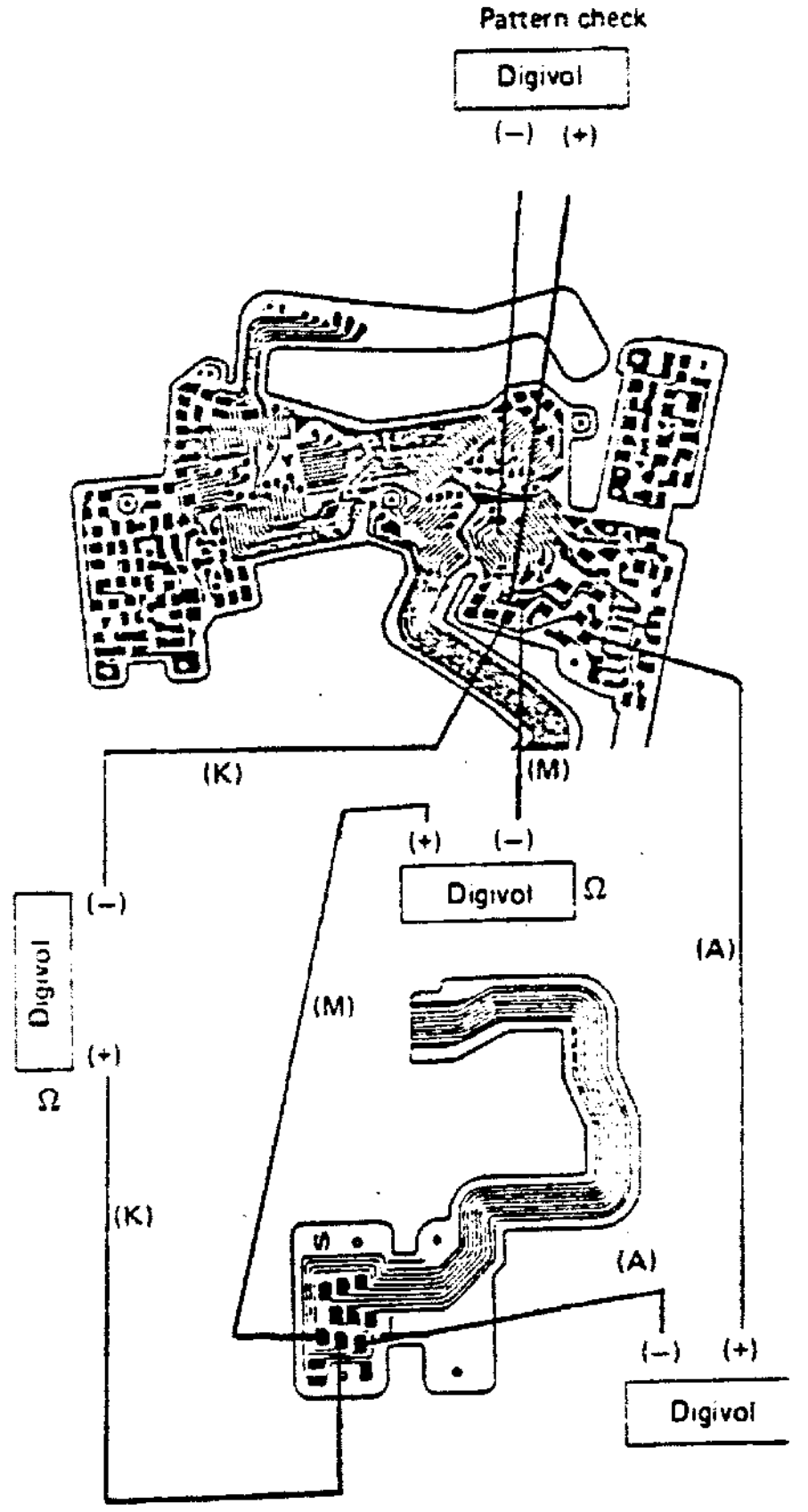
3. Bar indication invariable with shutter dial

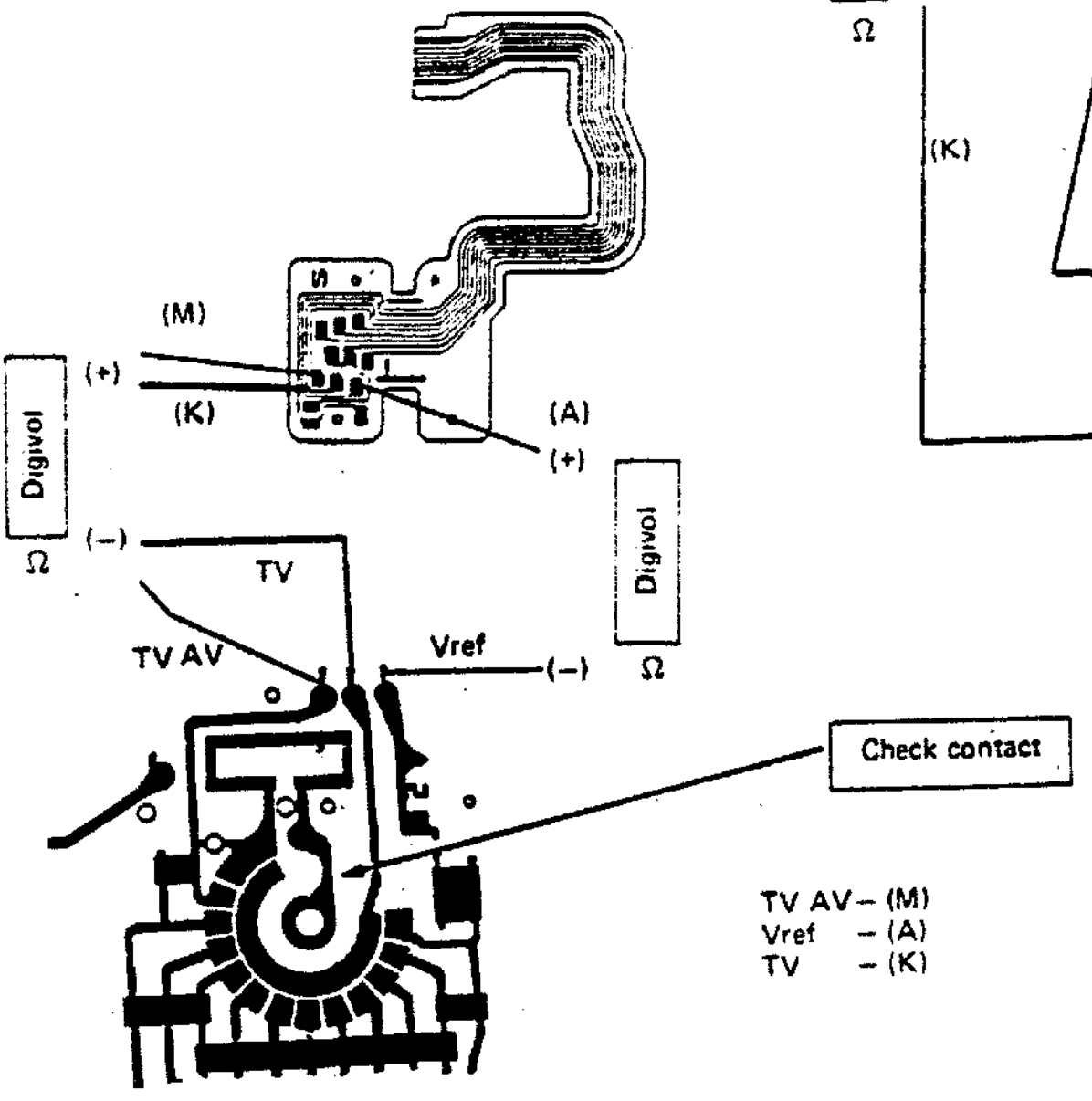
(1) When shutter is normal in MANUAL mode
- Indication circuit defective

(2) When shutter speed is abnormal in MANUAL mode
- Data input circuit defective
- Check continuity of each pattern and lead wire.



- TV circuit board must be continuous to M circuit board (resistance below several ohms).





TV AV – (M)
Vref – (A)
TV – (K)

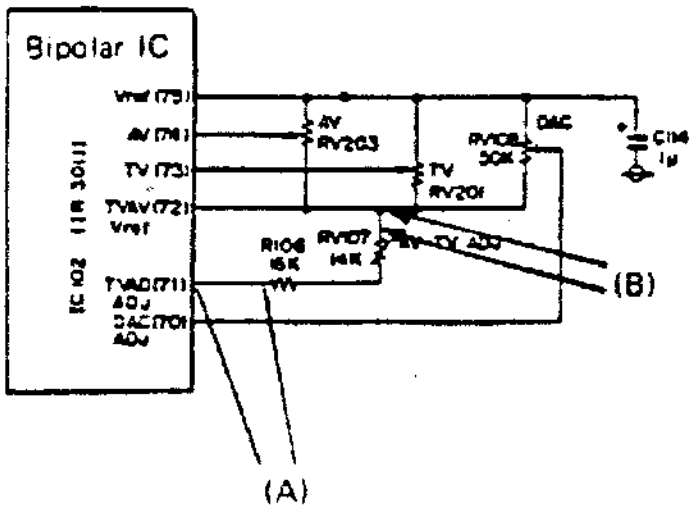
4. Bar indication invariable with F stop ring or shutter dial

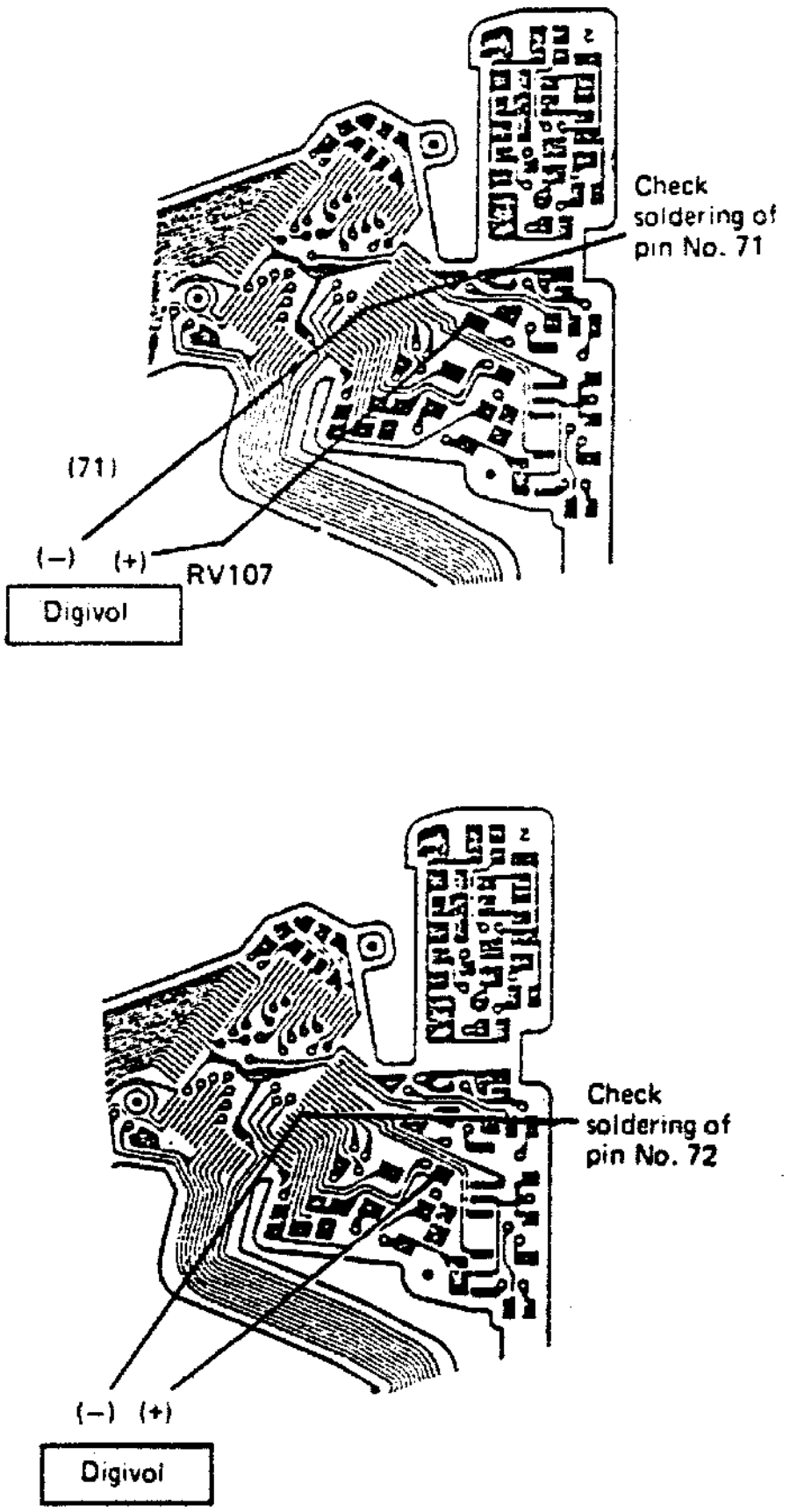
(1) When shutter operates normally in AUTO and MANUAL modes

- Indicator circuit (LCD·D or LCD) defective

Shutter inoperative in MANUAL mode and bar indication invariable with F stop ring.

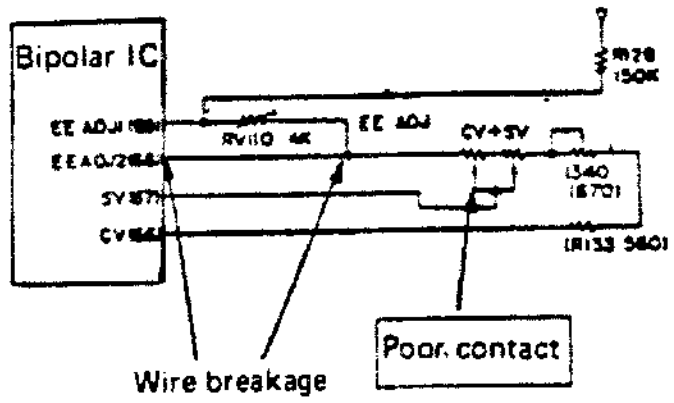
- Data input circuit defective
- TV AV misadjusted (IC pin No. 71 or 72 defective)

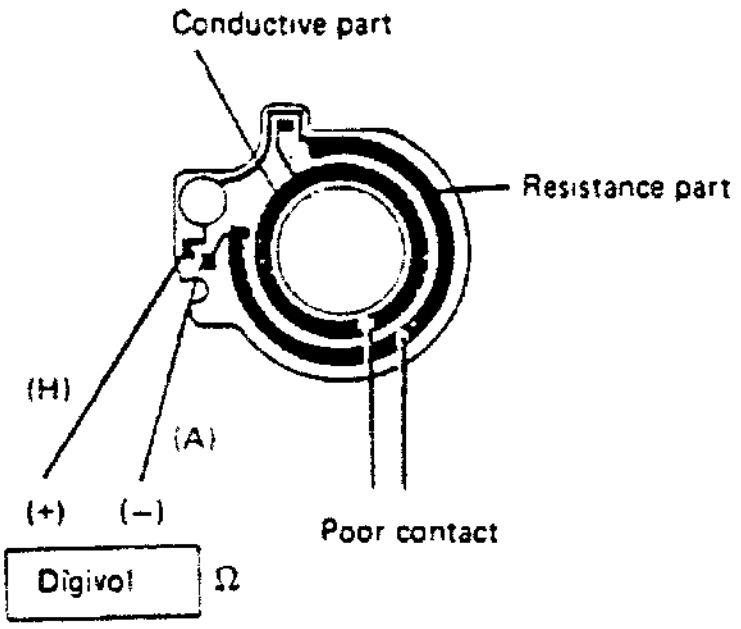




5. **Bar indication invariable with ASA**

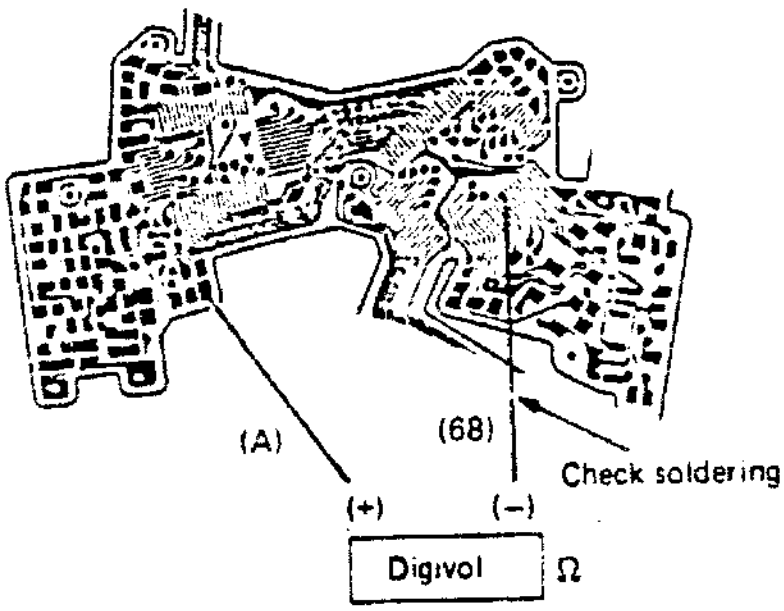
- When shutter operation is normal, indication circuit is defective.
- Bar indication variable with exposure compensation. In this case, data input circuit is defective.





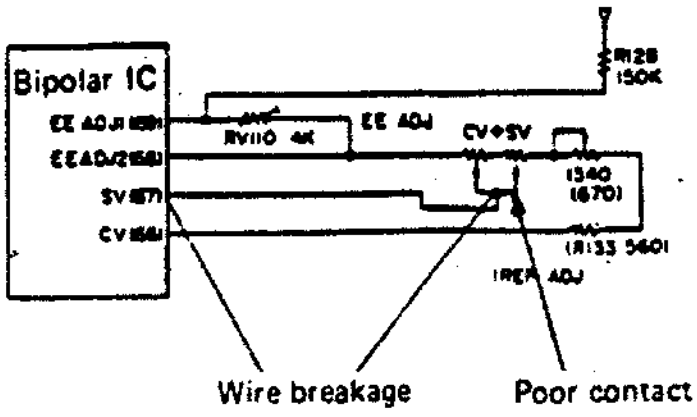
Resistance should be variable depending on ASA

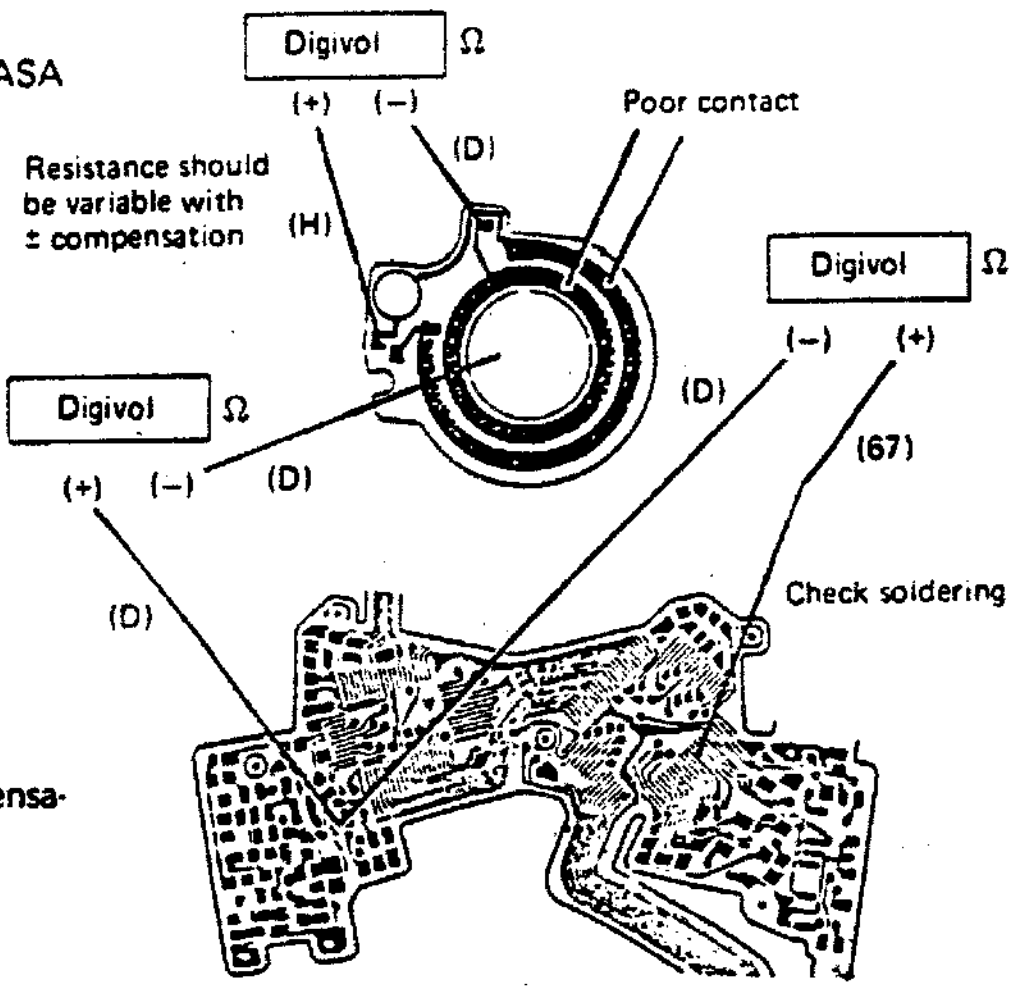
- When bar indication variable with exposure compensation but invariable with ASA.
  1. Poor contact on ASA contact
  2. Pattern No. 68 broken



6. **Bar indication invariable with exposure compensation**

- When shutter operates normally, indication circuit is defective.
- When bar indication is variable with ASA (normal), data input circuit is defective.

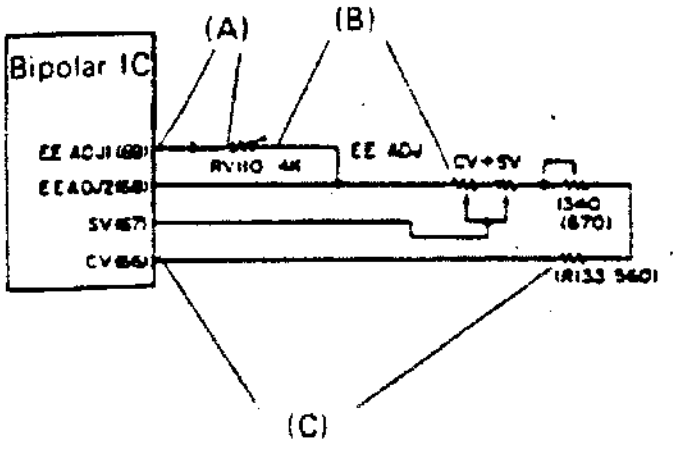




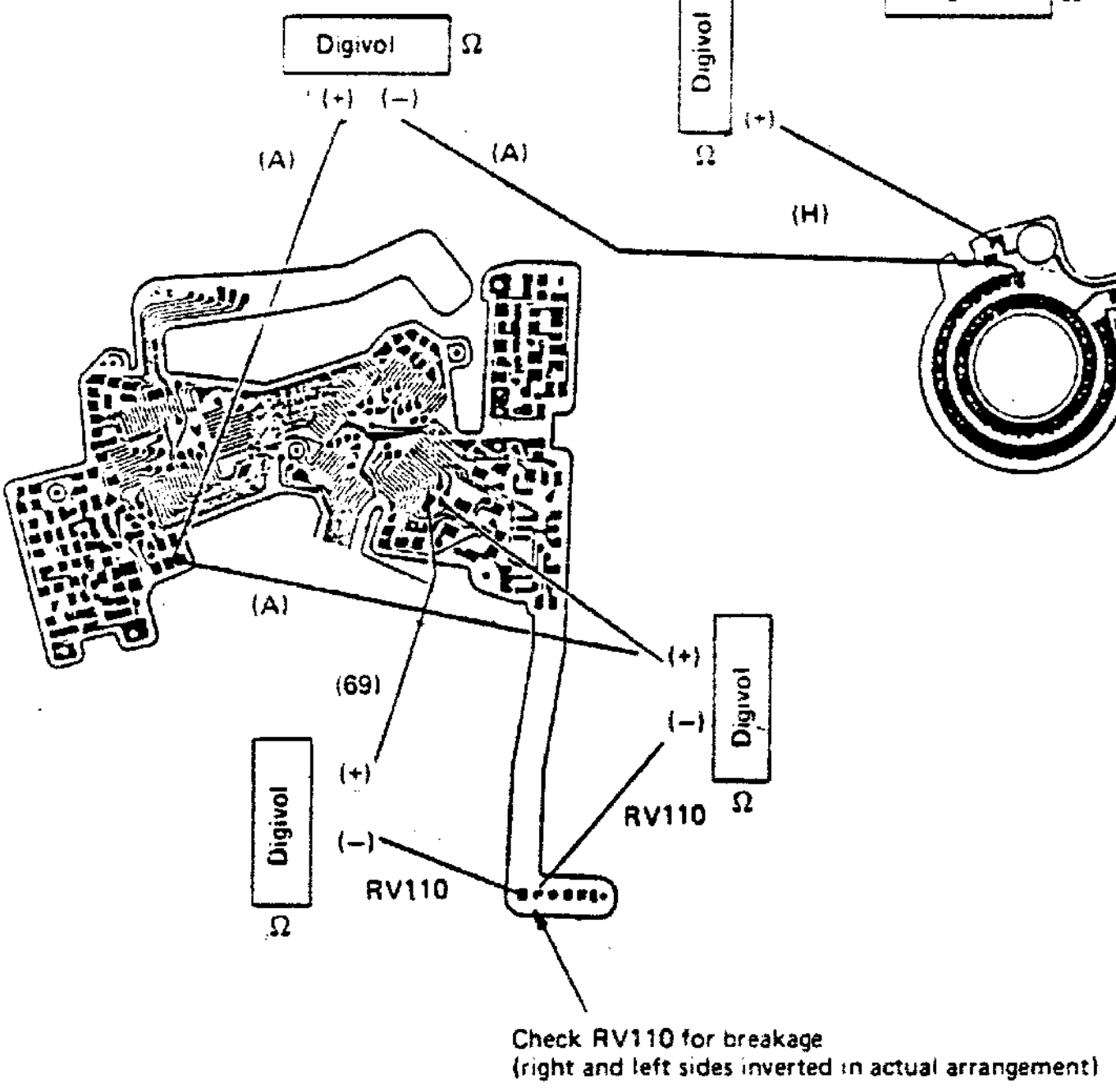
1. Poor contact on exposure compensation contact
2. Pattern No. 67 broken
3. Orange lead wire broken

7. Bar indication invariable with ASA or exposure compensation

- When shutter operates normally, indication circuit is defective (LCD·D or LCD).



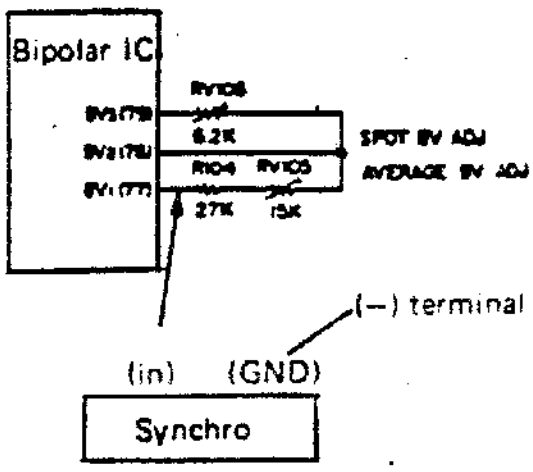
- Check continuity of (A), (B) and (C) respectively.
- Check RV110 for breakage.



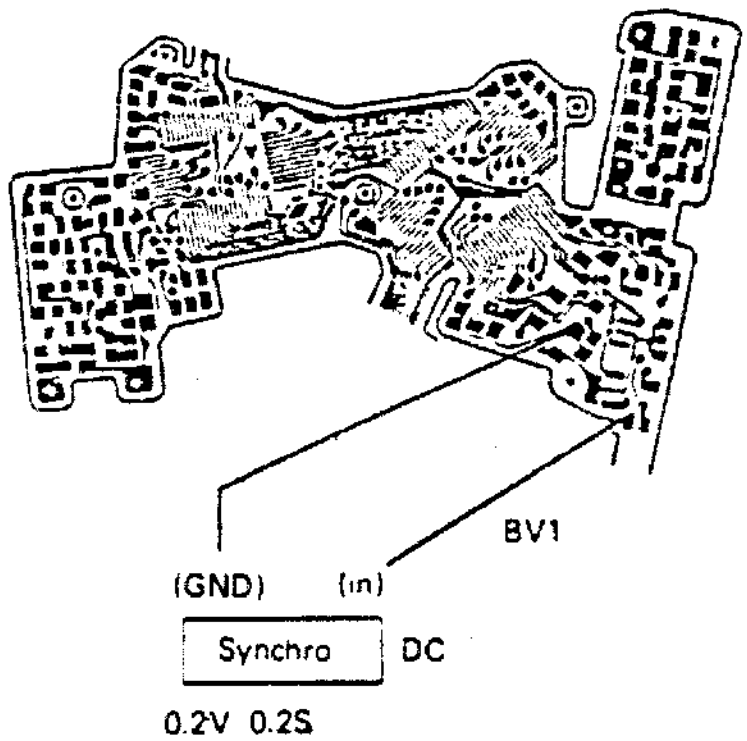
- Each continuity check should indicates resistance below several ohms.
- Resistance exceeding scores of ohms indicate wire breakage.

8. Bar indication invariable with BV

- Check BV input voltage.
- For simple check, measure BV1 voltage.



- Measure voltage with a synchroscope (a digital voltmeter is usable though it provides unstable reading).



- Check voltage while varying light incident on lens

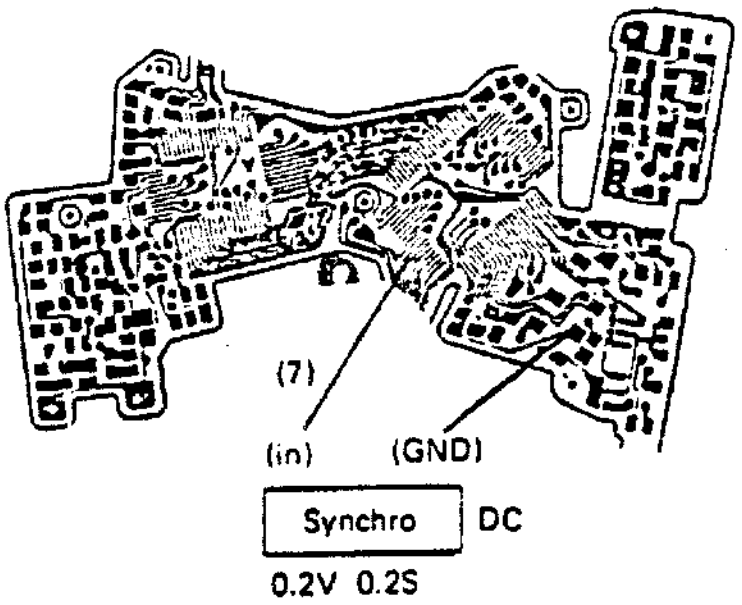
(1) BV input provided from head amplifier?
Vref standard voltage −200 to −100 mV: OK

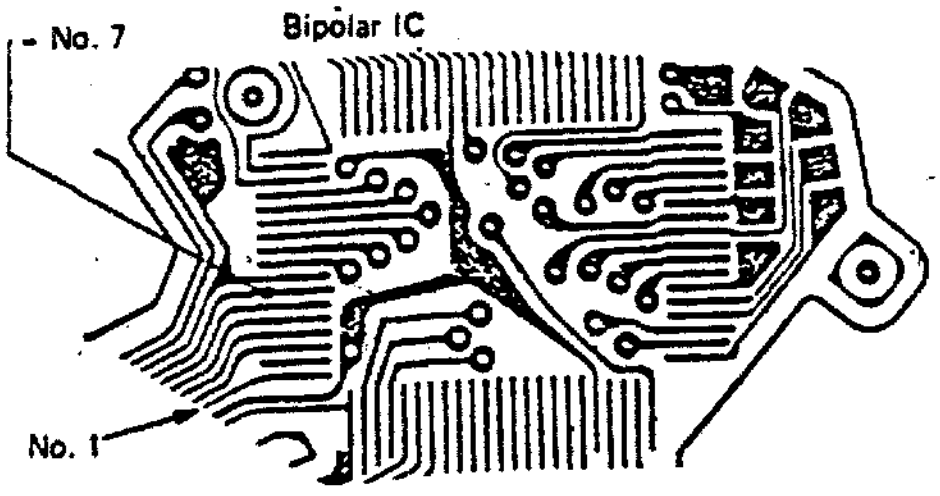
(2) The input voltage variable depending on brightness?
Variable: OK

(3) When input voltage is provided and variable depending on brightness, BV level converter circuit is defective.

(4) When BV input voltage is not provided or invariable depending on brightness, head amplifier is defective.
- Check input voltage on pin No. 7 of bipolar IC.
- When input voltage is not provided or invariable, check head amplifier.
- See page E-151.
(Head amplifier or related part defective)

When input voltage is not applied to BV1



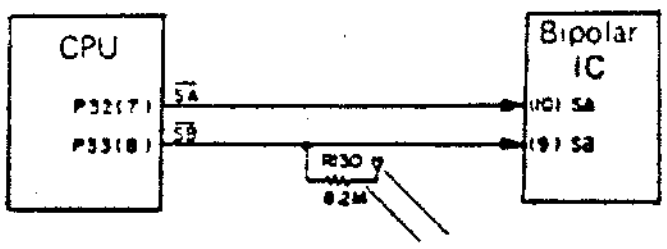


(8) Bar Indication Blinks

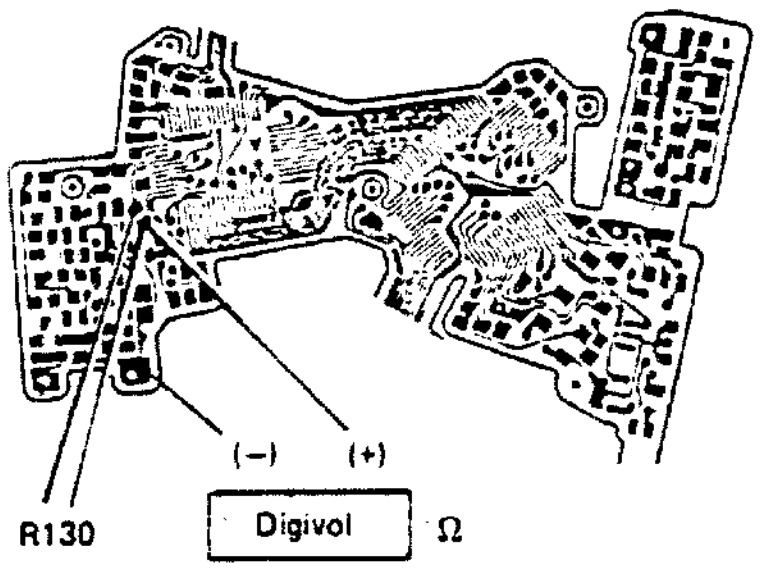
- Bar indication blinks about 3 segments
- Preparations
  1. Measuring instruments: - Digital voltmeter or circuit tester
     - Synchroscope
     - Luminance box
  2. Mode: - AUTO or MANUAL (lens should be attached in position)
  3. LCD should be lit in viewfinder.
- Shutter dial must not be set at B or mecha. 1/60.
- Bar indication blinks under fluorescent lamp or in day light when it varies 1/3 or more.
- When bar indication blinks in day light, turn camera to vary light intensity.
- Check whether or not bar indication stops blinking in B.C. mode.

1. Bar indication stops blinking in B.C. mode

- Pull amp resistor of SB terminal disconnected.



- Check pattern for breakage between R130 and camera body.

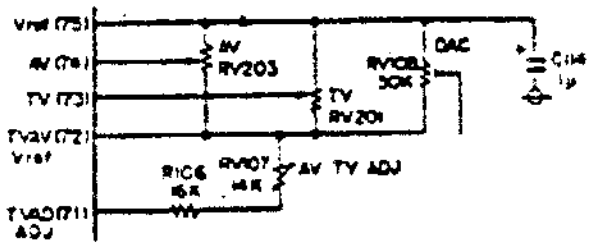


Should be lower than several ohms.

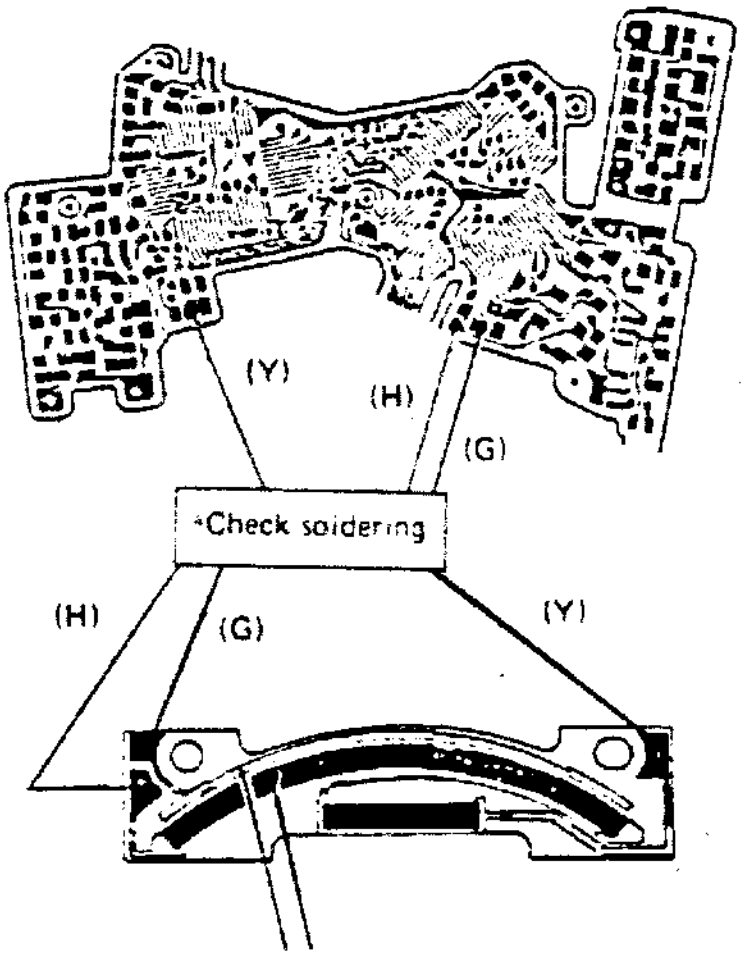
2. Bar indication does not stop blinking in B.C. mode

(1) AV TV circuit defective

(a) Check A.V contact for floating up.
(b) Soldering defective



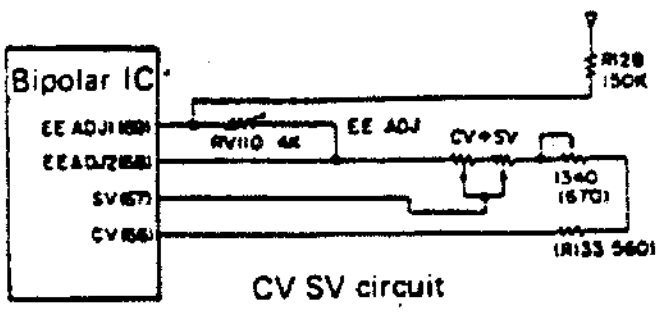
AV TV circuit



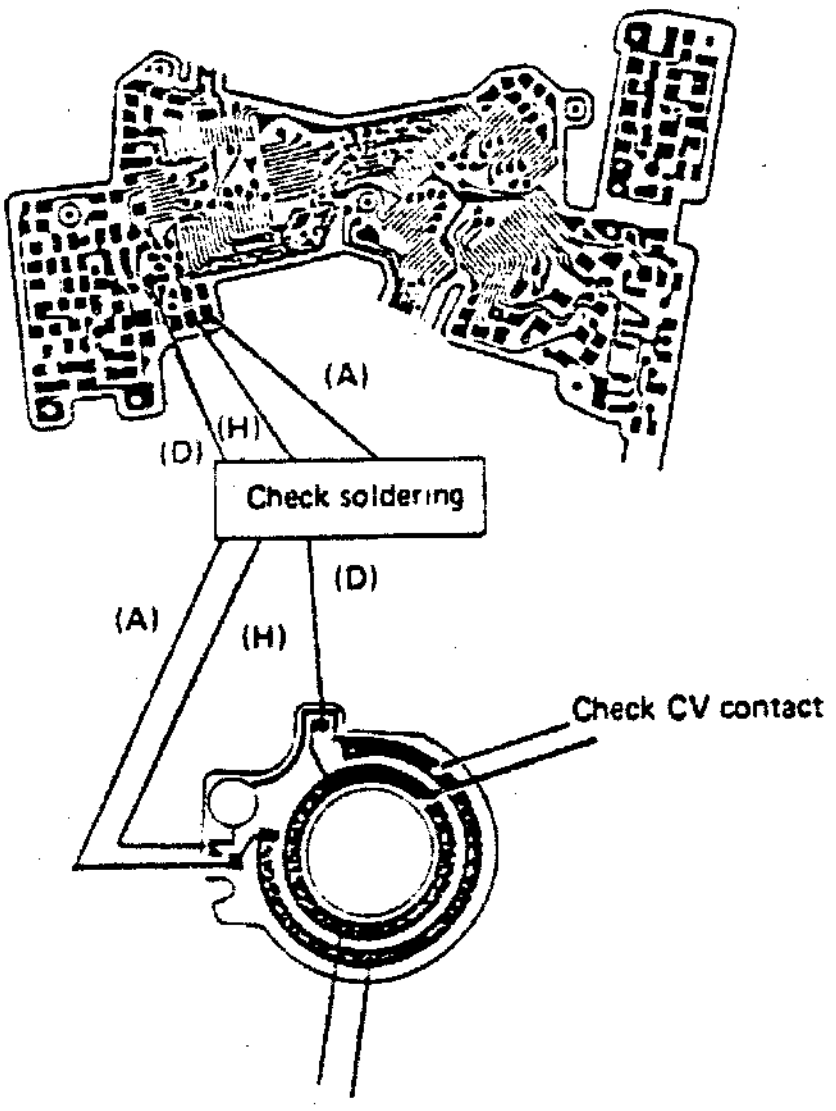
Check AV contact

(2) CV, SV circuit defective

(a) Check CV, SV contact for floating up.
(b) Soldering defective.



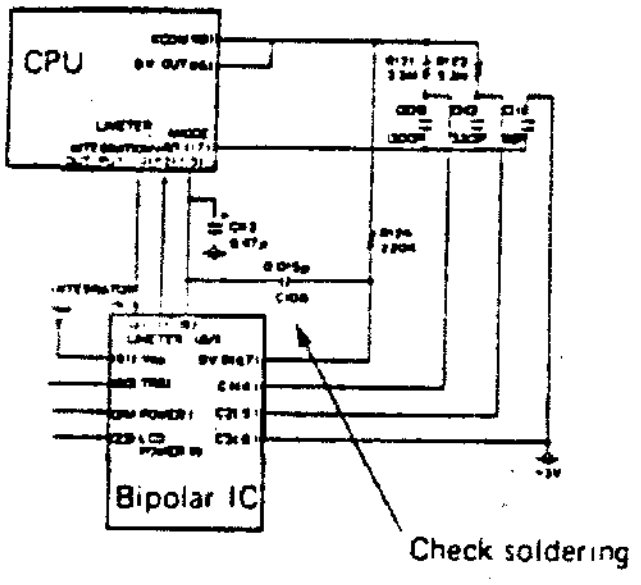
CV SV circuit

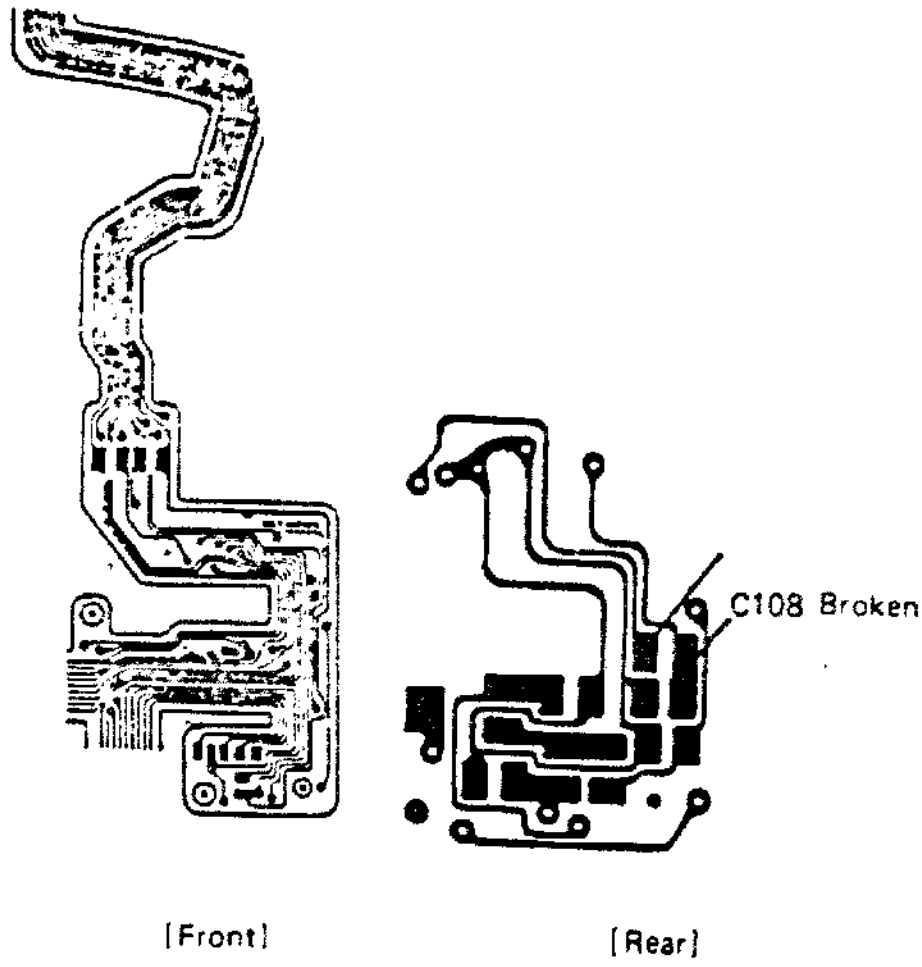


Check SV contact

3. **Bar indication blinks during operation with luminance box?**

- When bar indication does not blink during operation with luminance box.
  - C108 floated up
  - Resolder





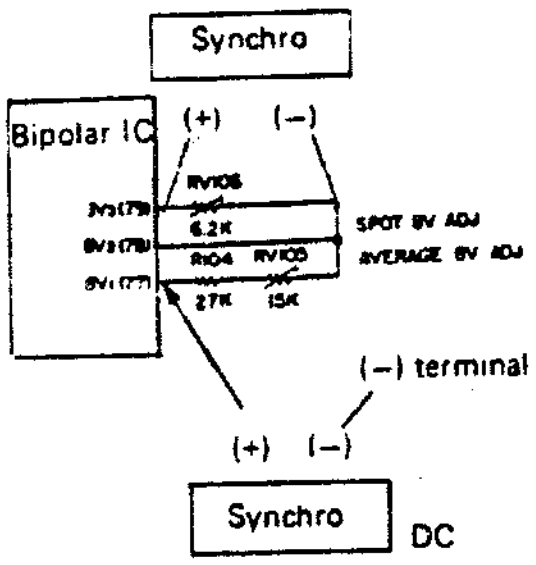
(9) Head amplifier or related part defective

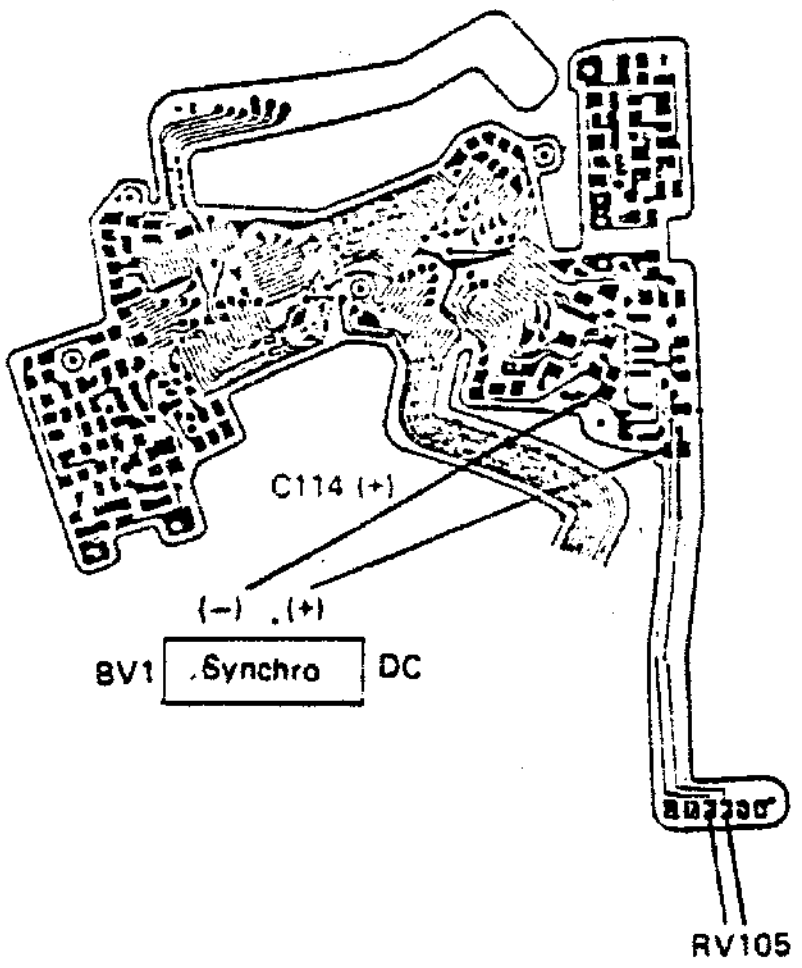
- BV output is not provided or invariable.
- Head amplifier or part related to its input/output abnormal.
- Indication abnormal due to defective head amplifier or related part. This type of trouble should be considered separately from exposure.

- Preparations
  1. Measuring instruments: ○ Digital voltmeter or circuit tester
     ○ Synchroscope
     ○ Luminance box
  2. Mode: ○ AUTO or MANUAL (Lens should be attached in position.)
  3. Light LCD in viewfinder.

- Shutter dial must not be set at B or mecha. 1/60.

1. BV input provided from head amplifier?





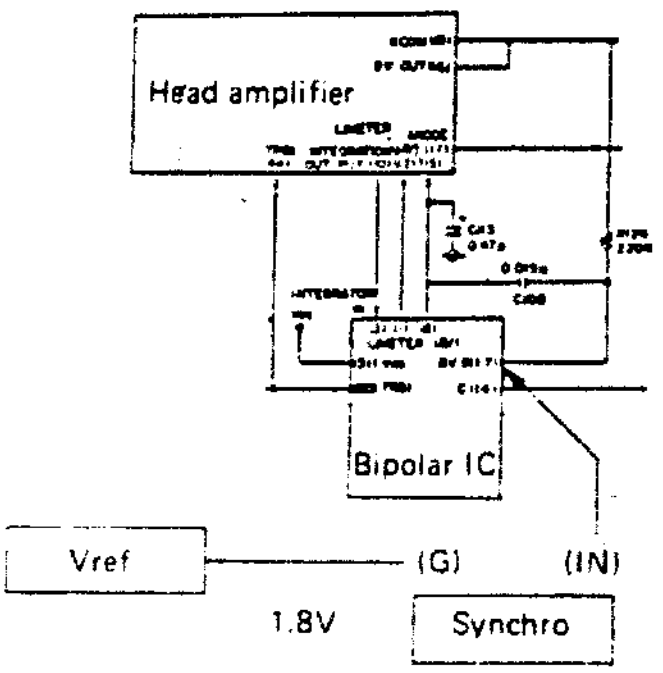
- Measure voltage with a synchroscope.
  DC 0.2V, 0.2S
  (A digital voltmeter is usable though reading is unstable on it.)

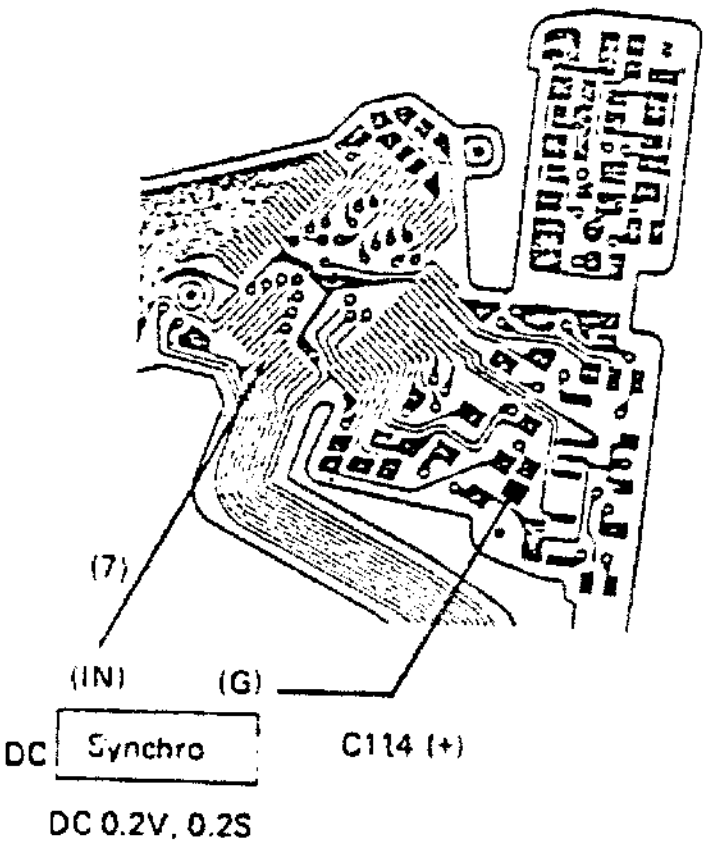
(1) Check BV1 input voltage.
- At BV11 and F5.6

Average BV	−170 ± 25 mV
Spot BV	−170 ± 25 mV

(2) When BV1 input voltage is not provided

- When no output is provided BV1. check output on pin No. 7 of bipolar IC.





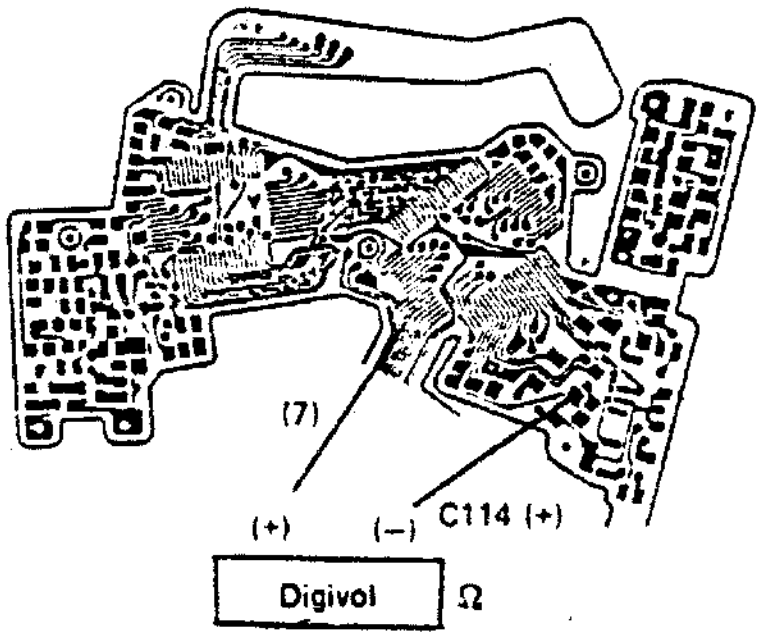
*Remove adhesive agent from bipolar IC leg No. 7.

- At BV11 and F5.6

Average BV	−170 ± 20 mV
Spot BV	−170 ± 20 mV

(3) When input voltage is applied to pin No. 7 and not applied to BV1 (leg No. 77).

- Check pattern for breakage between IC leg No. 7 and C114 (+).



2. Diagnosis by measuring BV1 input voltage

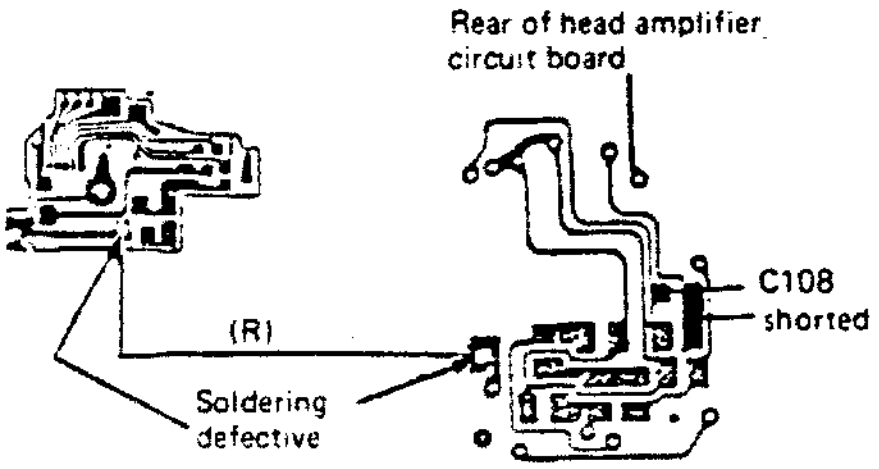
(1) −200 to −100 mV relative for Vref

Normal (OK)
(BV output voltage is not provided from head amplifier, when BV1 input voltage is −200 mV and invariable depending on brightness.)

(2) −350 to 200 mV relative to Vref

(+) power (Vcc) not supplied to head amplifier.

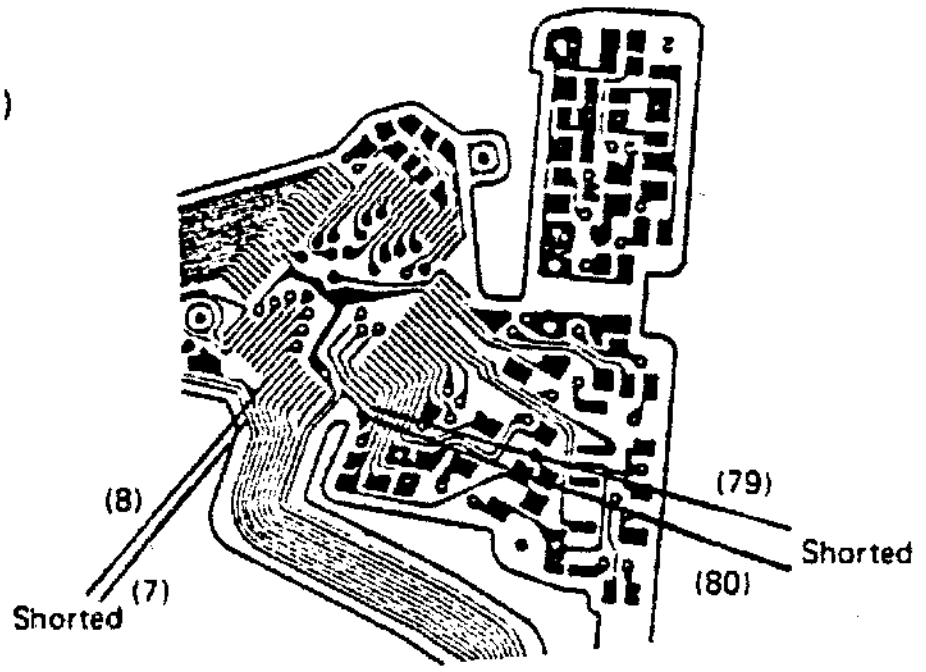
Check Vcc input to head amplifier



(3) On the order of ±10 mV
- Shorting between bipolar IC pin No. 7 and pin No. 8
- C108 shorted or broken

(4) On the order of +650 mV
- Shorting between bipolar IC pin No.(79) and pin No. (80)

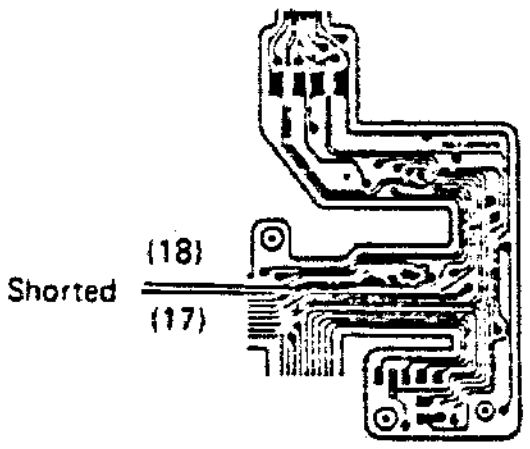
Check shorting of IC (7) ~ (8) and (79) ~ (80)



(5) On the order of −1.8V relative to Vref

- Shorting between head amplifier IC pin No. (17) and pin No. (80)

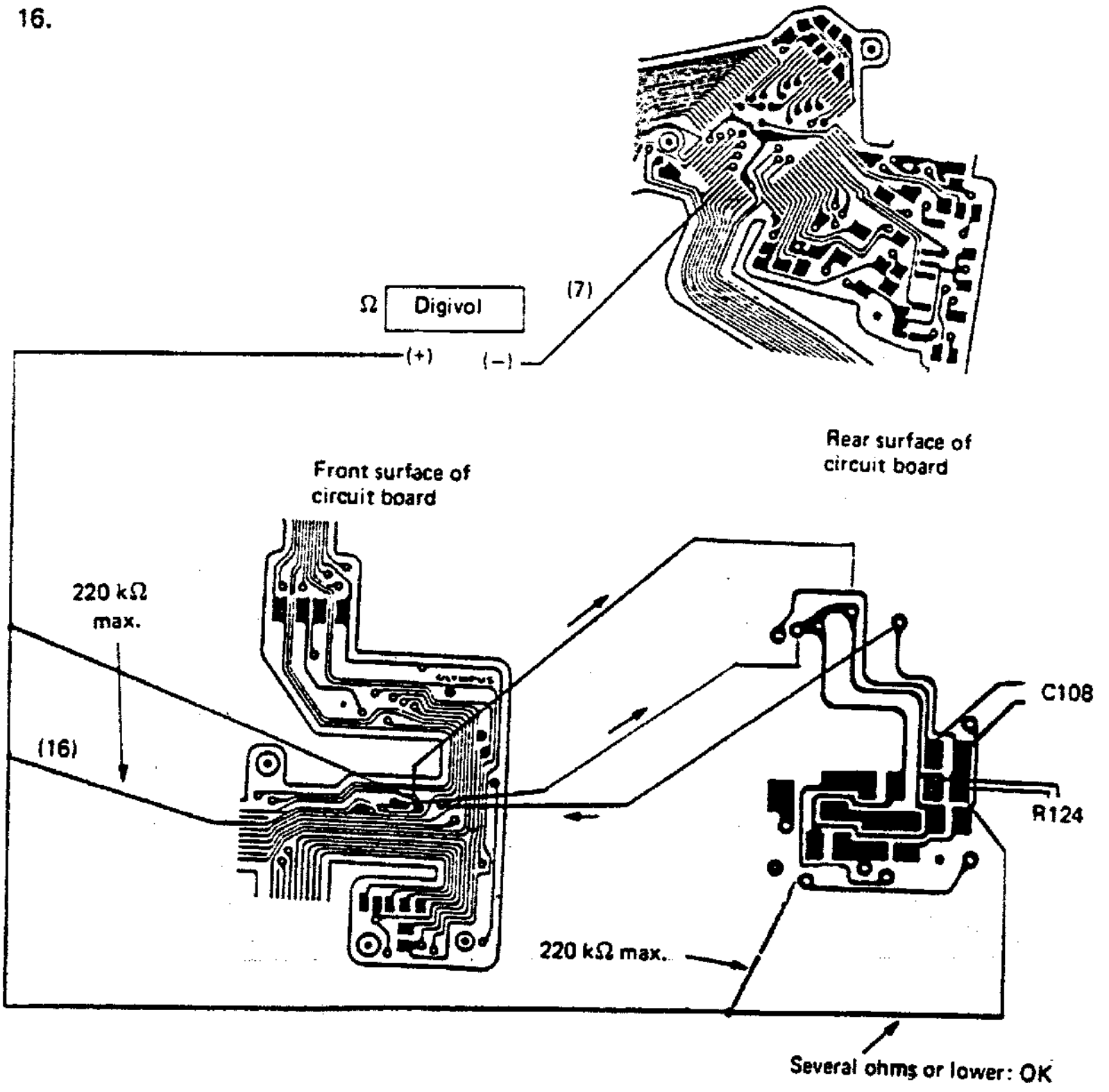
Check shorting of IC (17) – (18)



3. 8V input not applied to bipolar pin No. 7
Check head amplifier and related parts

(1) Normal operation in DIRECT AUTO mode:
Head amplifier is operating since integral output is provided.
- Detach front plate.

(a) Check continuity between bipolar IC pin No. 7 and head amplifier pin No. 16.
- 220 kΩ max. via R124
- Several ohms max. when R124 is not connected.
- Check soldering of head amplifier leg No. 16.



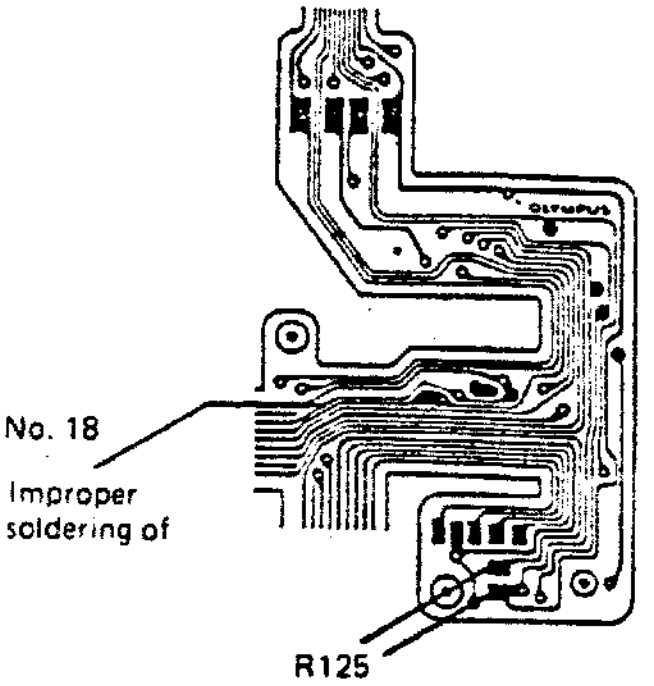
b) Terminal of R125 shorted to conductive plating
   - Bar indication fixed on low luminance side.

(c) Improper soldering of head amplifier IC pin No. 18
   - Bar indication fixed on low luminance side.

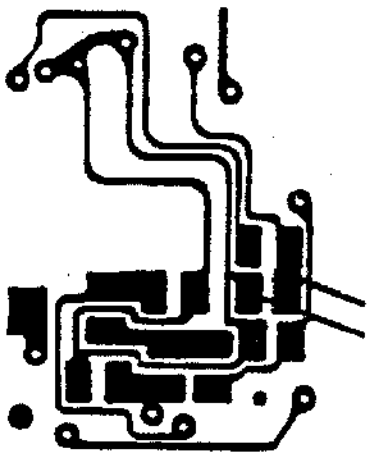
(d) R124 broken or soldering defective
   - Bar indication fixed on low luminance side.

(e) Other symptom can be traced to defective head amplifier IC.

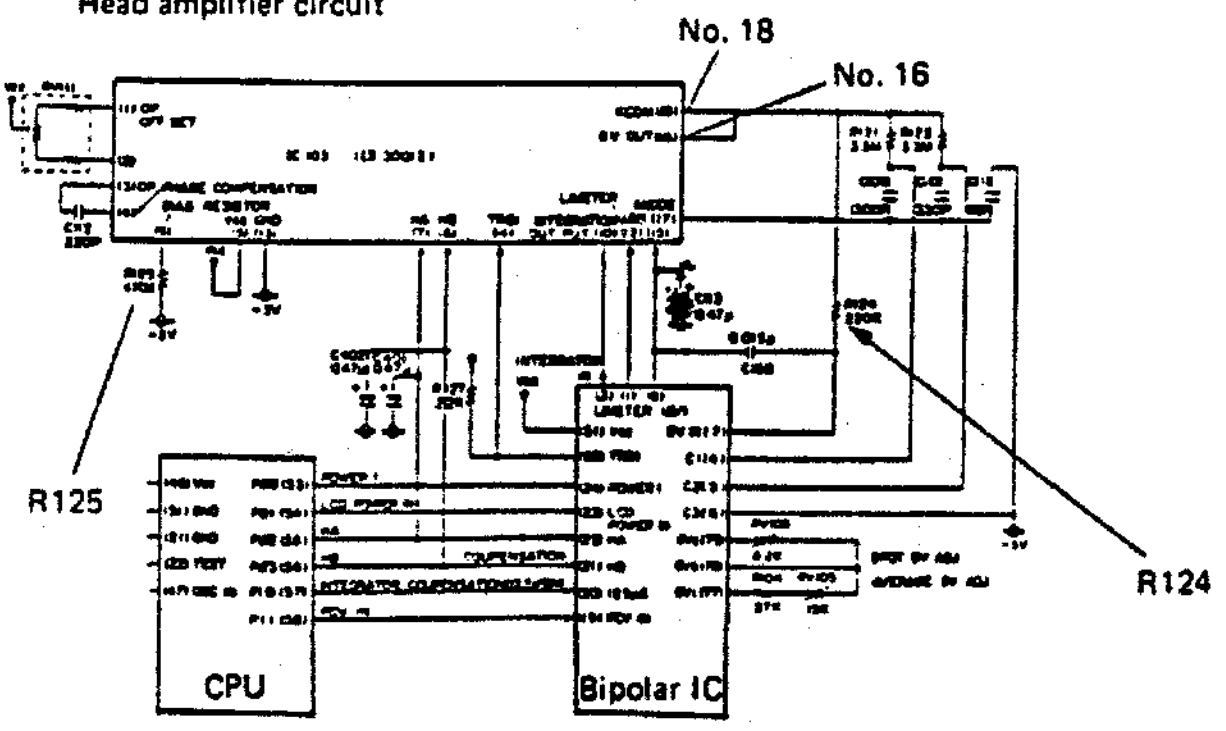
Improper soldering of No. 18
R125 shorted to conductive plating



R124 broken or soldering defective



Head amplifier circuit



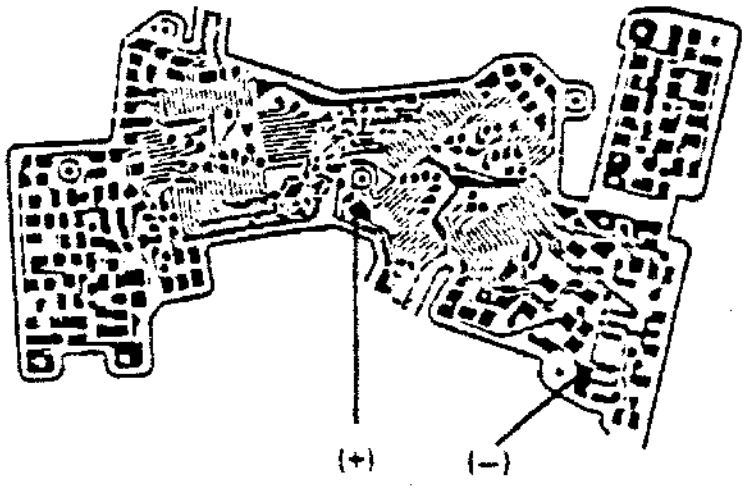
(2) No operation (EE accuracy low) in DIRECT AUTO mode
- Abnormal switching of indications and exposure time

(a) Check whether or not HA and HB signals are provided from CPU.
- Simple check

HB: Output of 1.8V should be obtained by switching of 1.8V/1V.

HA: Voltage across BV3 – BV2 (in B.C. mode) should normally be:
0 mV in average
25 mV by spot light measurement

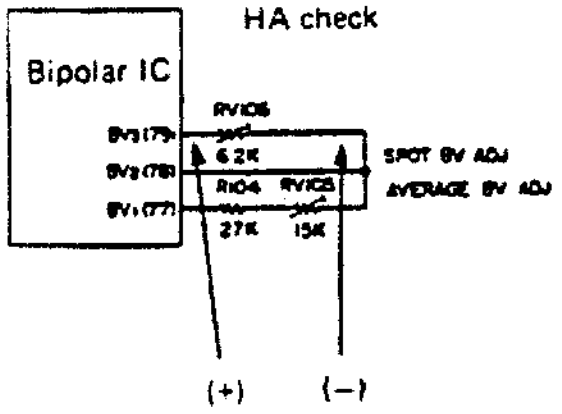
HB check



Digivol DC

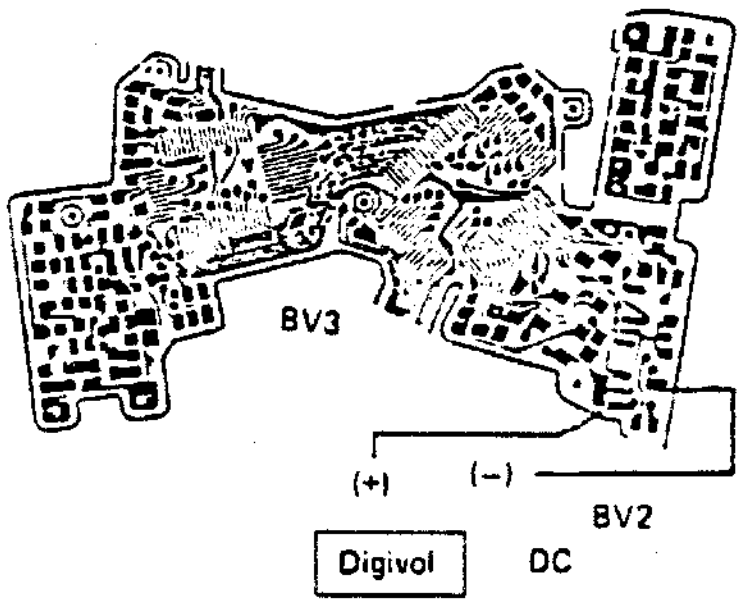
- 1.8V during indication
- 1V during exposure

HA check



Digivol DC

HA check



Digivol DC

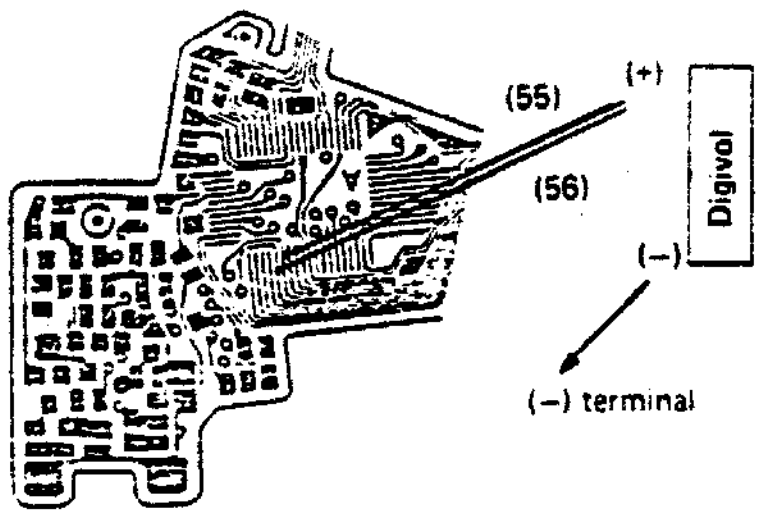
- 0 mV in average
- 25 mV by spot light measurement
- Mode: B.C.

- When the simple checks do not indicate normal values, check voltages on CPU IC pins Nos. 55 and 56.

(Voltages in average light measurement)
HA: 3V on pin No. 55
HB: 3V on pin No. 56

Voltage checks on IC pins Nos. 55 and 56

(b) When no voltage is applied, leg is improperly soldered or CPU IC is defective.



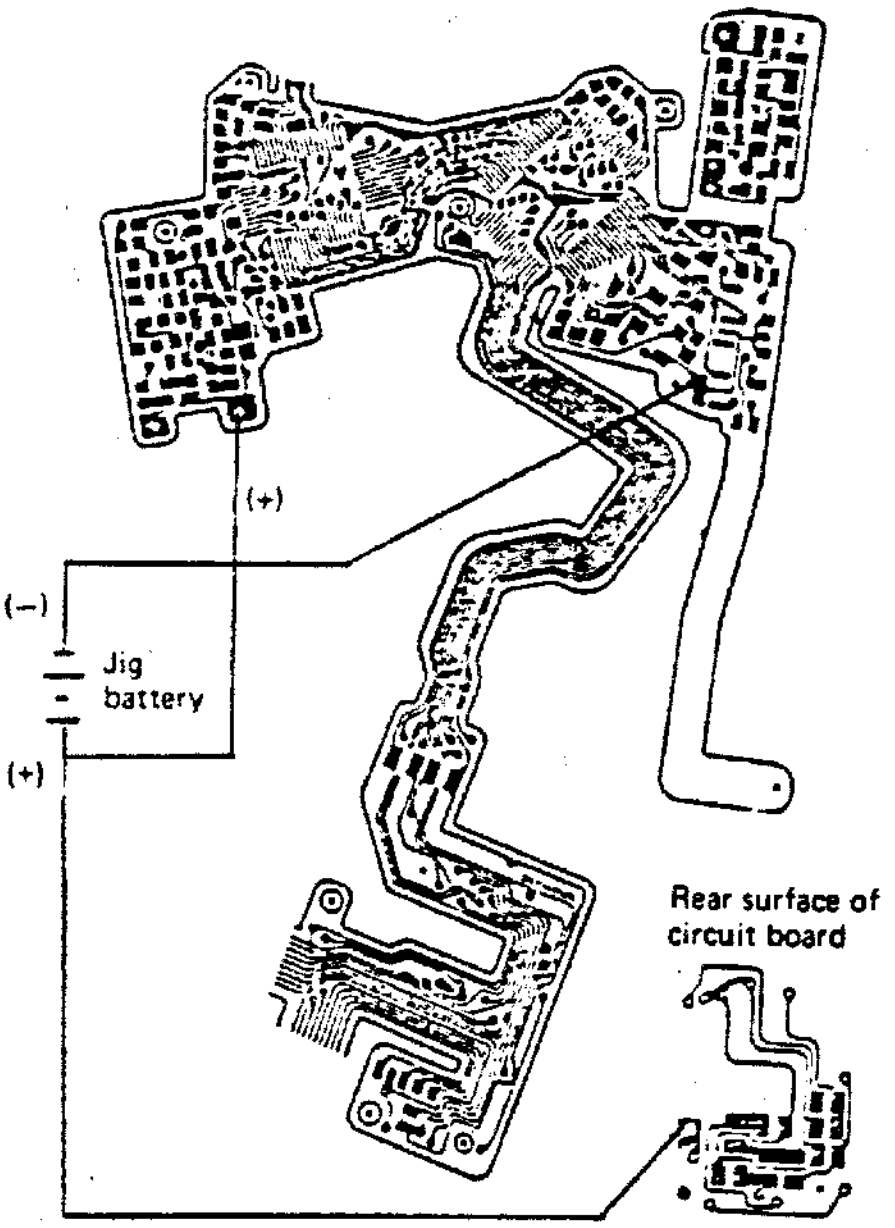
(c) When HA and HB signals are outputted from CPU

- Input applied to head amplifier IC pins No. 6 and No. 7?

Note: Detach front plate for checking voltages.

- After detaching front plate, light LCD while supplying power from a dummy battery.

Procedure for indication with front plate unit only



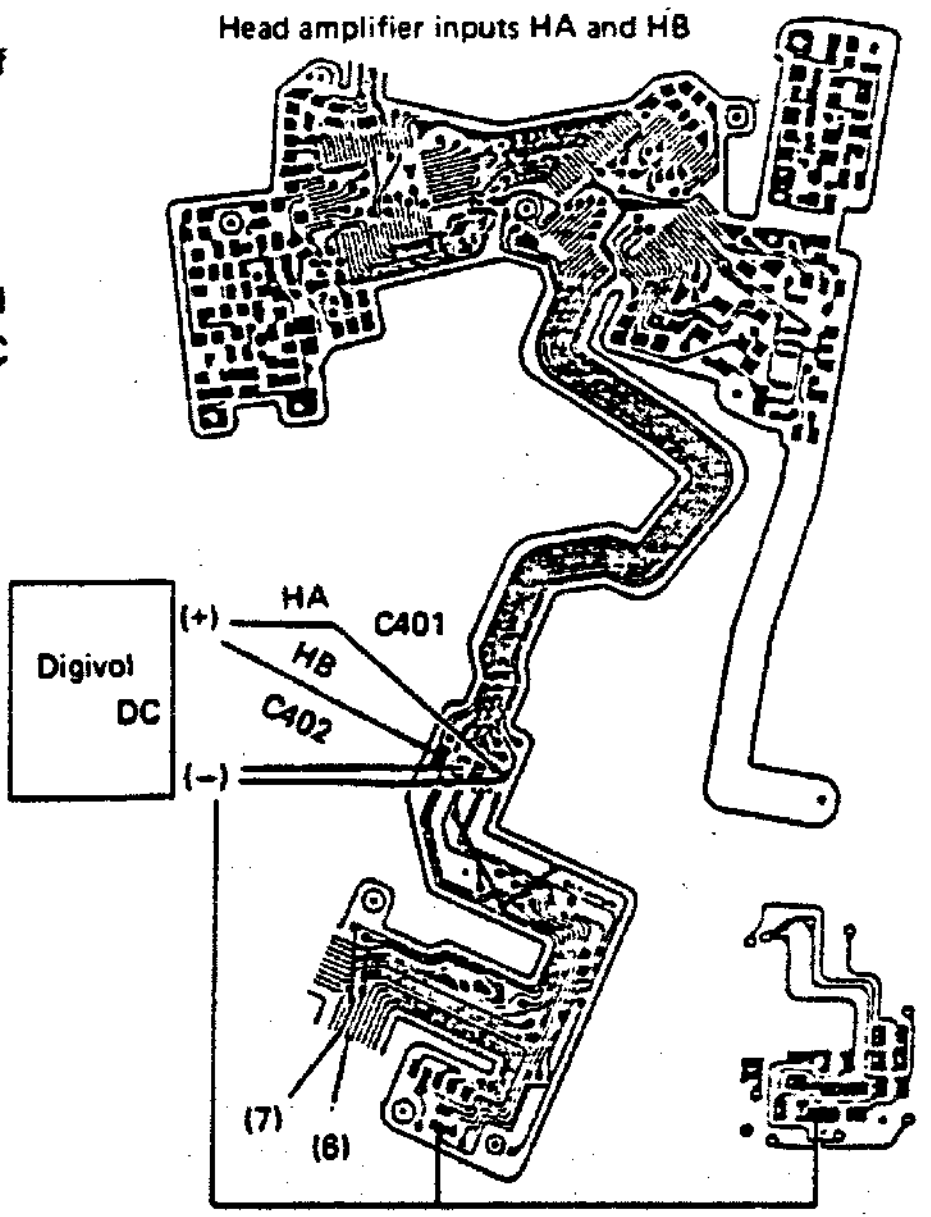
- Simple check
  - Measure voltages across both ends of C401 and C402.

    HA: C401 voltage = 3V
    HB: C402 voltage = 3V OK

- When the simple checks indicate abnormal values, check voltages on head amplifier IC pin No. 6 and pin No. 7

  Pin No. 6 = HB
  Pin No. 7 = HA

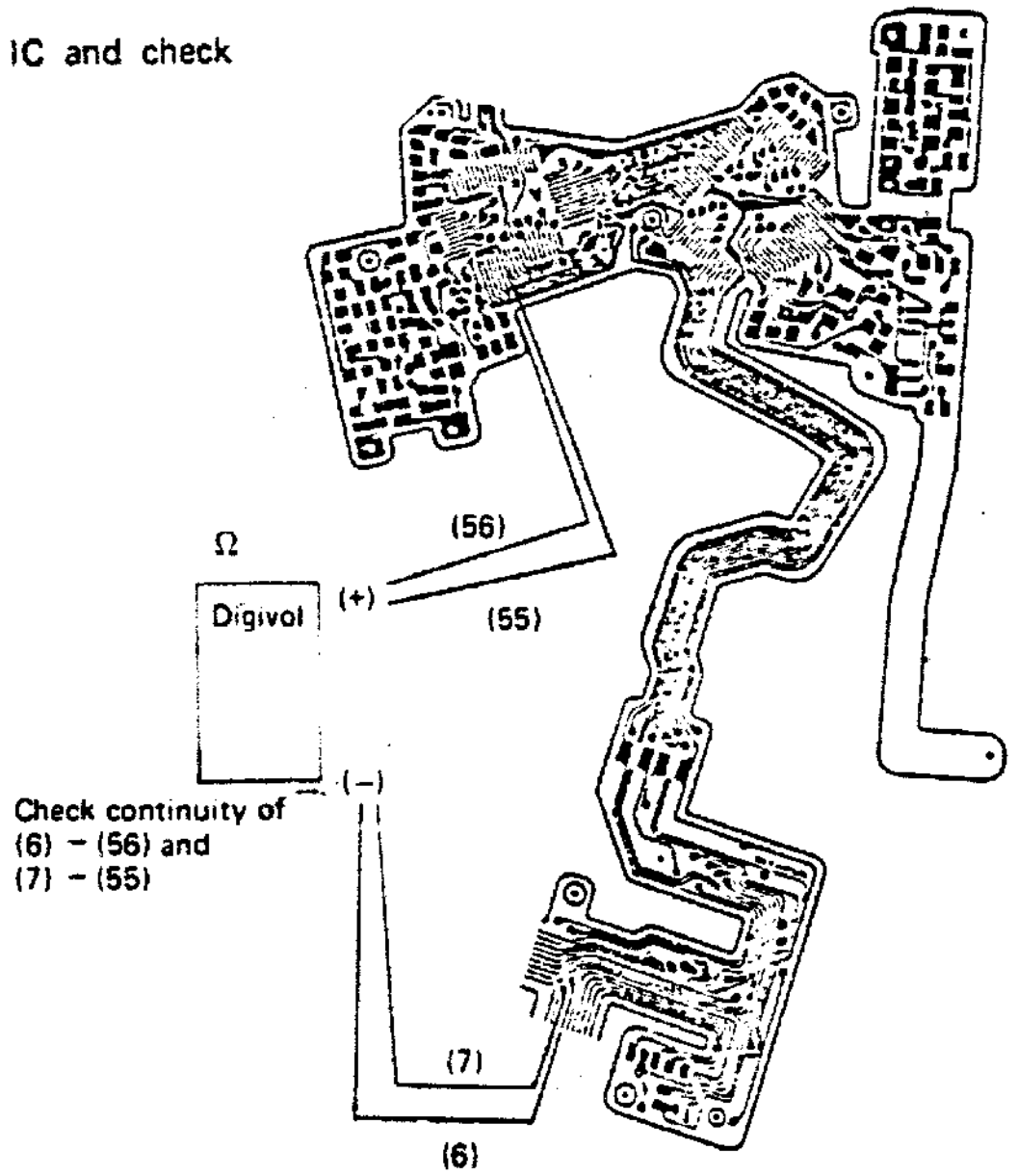
Head amplifier inputs HA and HB



(d) Check of HA and HB patterns

- When HA and HB are outputted from CPU but no input is applied to head amplifier, pattern is broken.
- Disconnect head amplifier IC and check pattern.

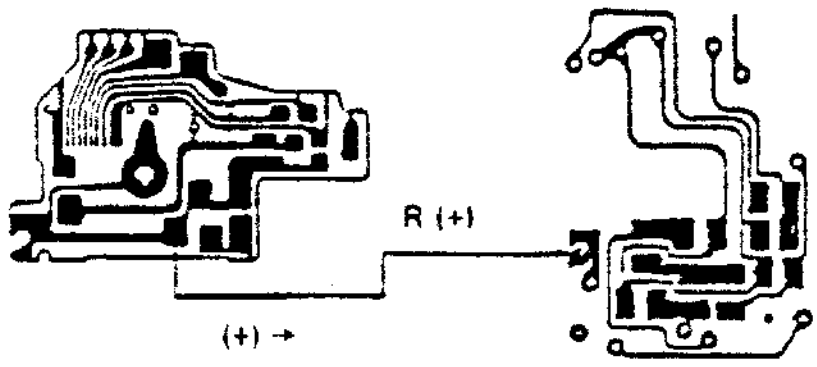
Check of HA and HB patterns



(3) Abnormal operation in DIRECT AUTO mode
- Shutter kept open in AUTO mode
- BV output and integral output are not provided.
- Signal provided from CPU?
  Head amplifier IC defective?

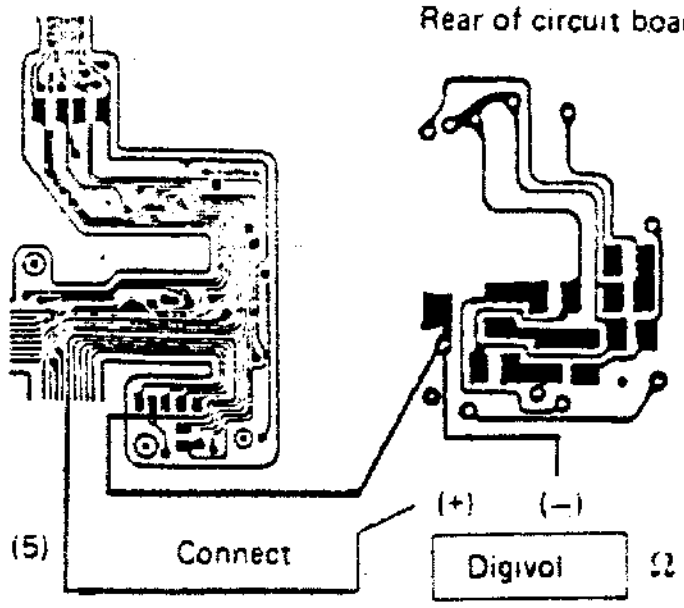
(a) (+) and (−) power supplied to head amplifier?
- Check resistance with a digital voltmeter. It should normally be lower than several ohms.

(+) power supply for head amplifier

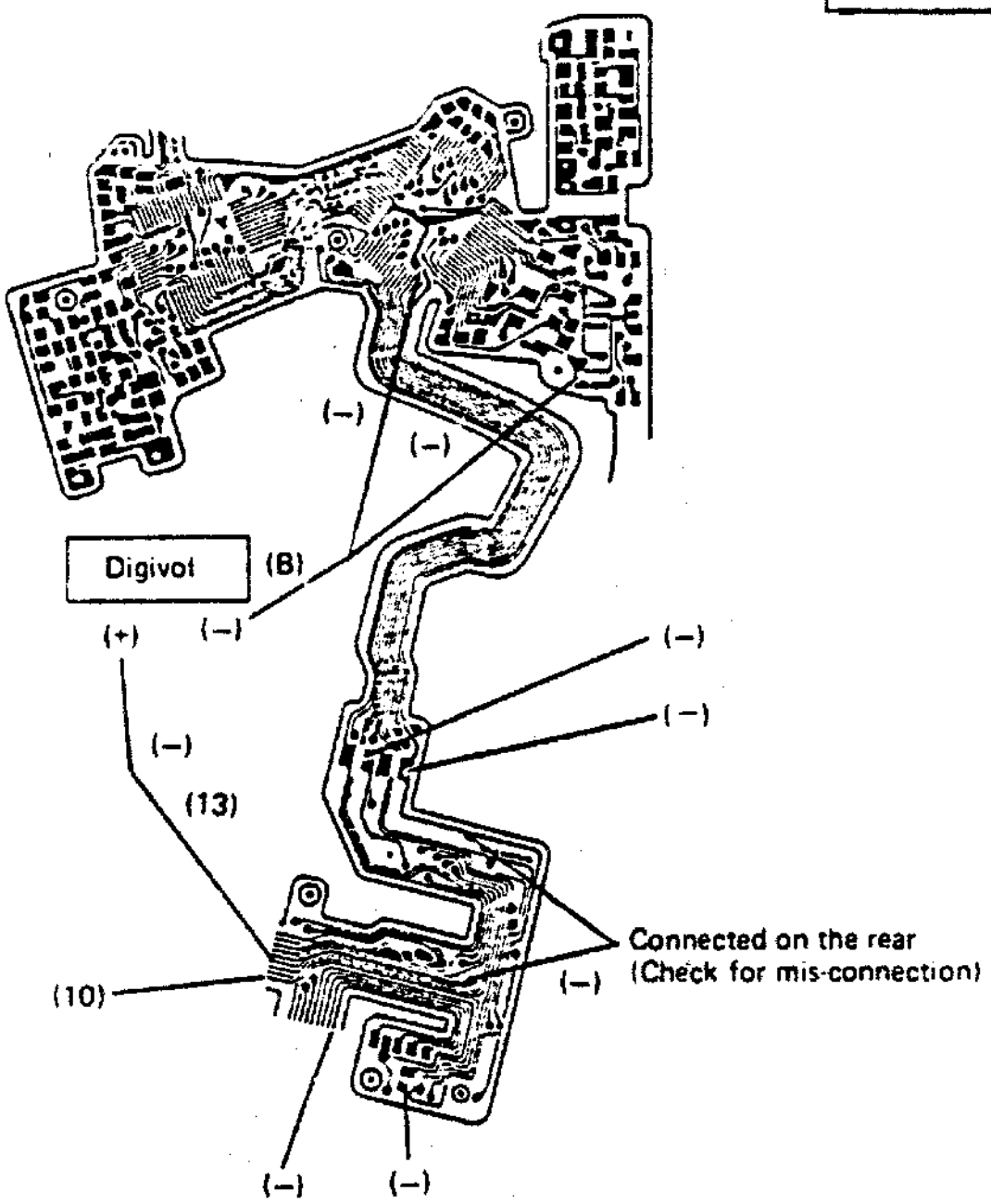


Rear of head amplifier circuit board

Rear of circuit board



(−) power supply for head amplifier

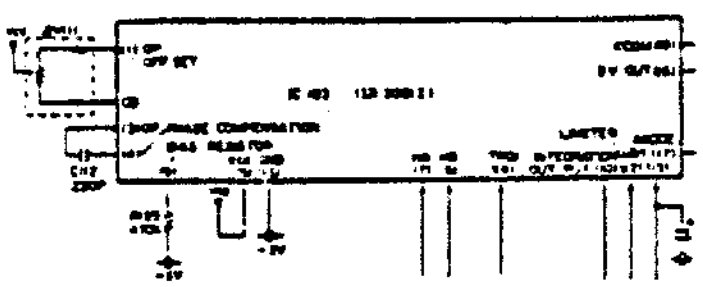


(b) Improper soldering of RV111

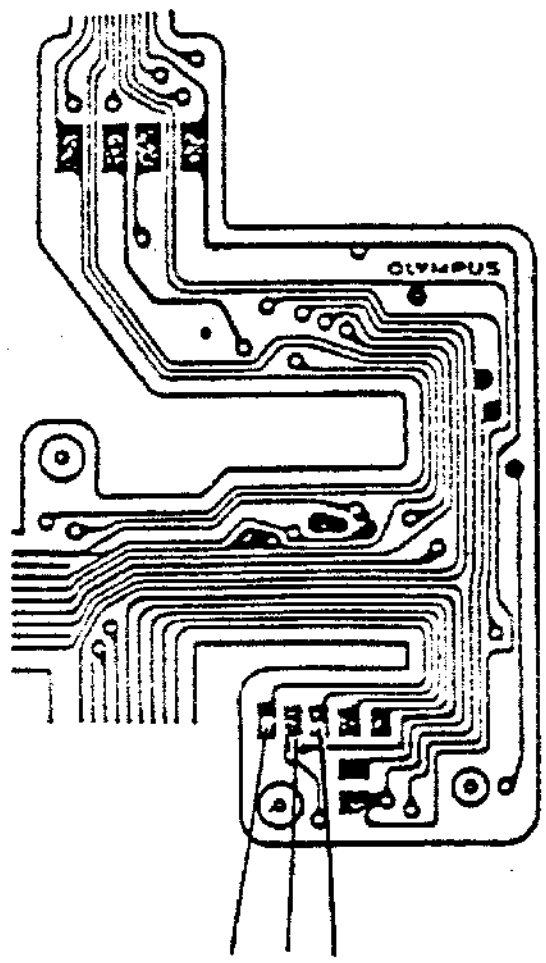
- Integration O.P. adjusting resistor
- Bar indication fixed on low luminance side.

Head amplifier

RV111



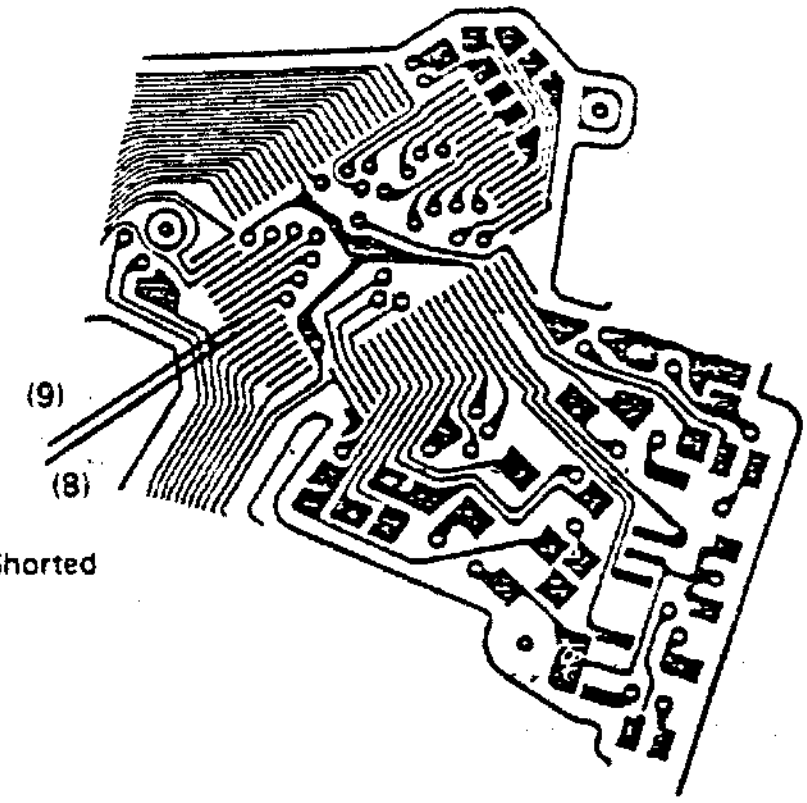
RV111 improperly soldered



RV111

(c) Shorting between bipolar IC pin No. 8 and pin No. 9

- SB signal pin shorted to 1.8/1V IC leg
- Bar indication fixed on low luminance side.



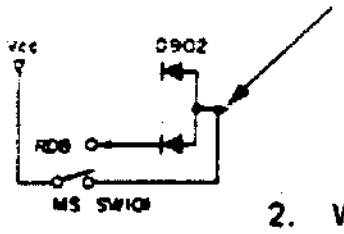
Shorted

3-3 Shutter Locked

- Indication normal (abnormal indication should be corrected in advance)
- Preparations
  1. Measuring instruments: ⊃ Digital voltmeter or circuit tester
     ⊃ Synchroscope (storage)
  2. Camera mode: ⊃ AUTO or MANUAL (B if camera is inoperative in AUTO and MANUAL modes)
  3. Perform checks by operating the shutter.

(1) Diagnosis with synchroscope

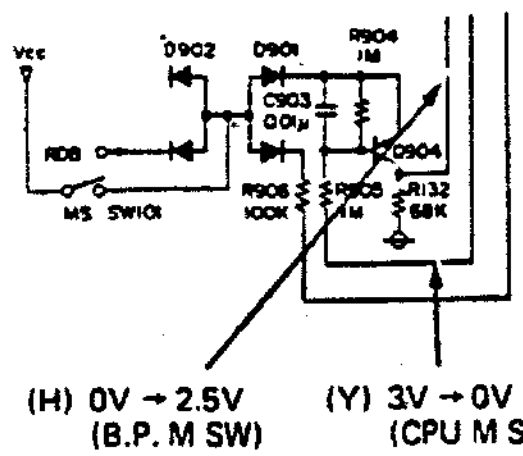
1. M SW OK?



1. Normally 0V → 3V

2. When waveform is invariable
   1. M SW defective
   2. (B) lead wire broken

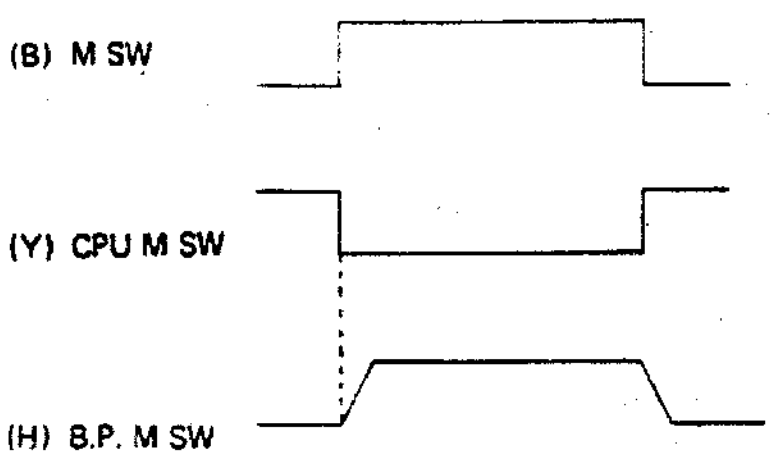
2. RS circuit board and related parts OK?



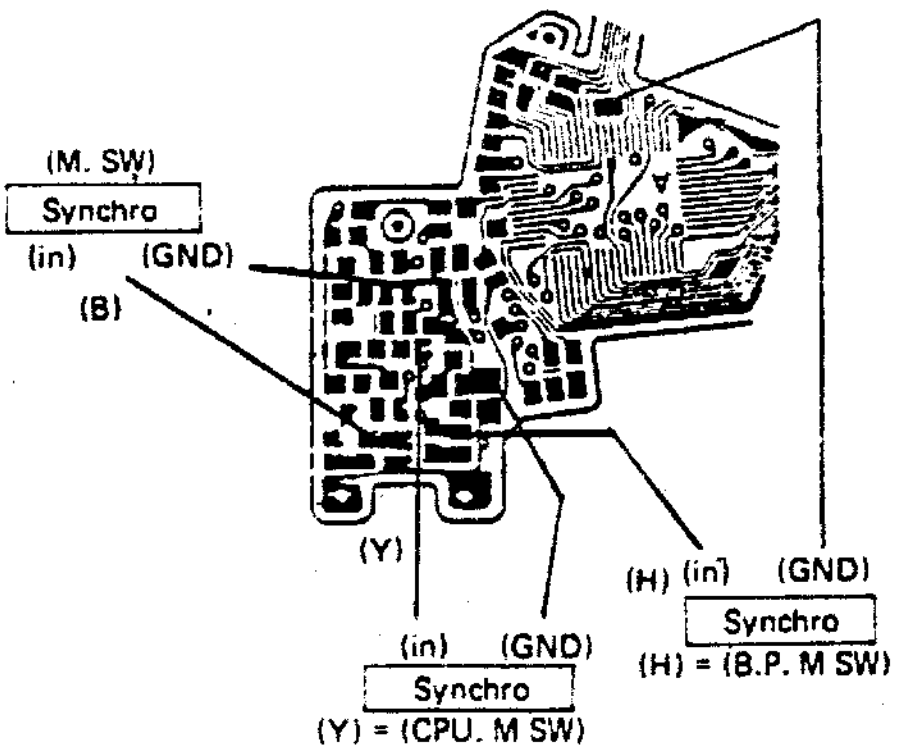
(H) 0V → 2.5V (B.P. M SW)

(Y) 3V → 0V (CPU M SW)

Time chart

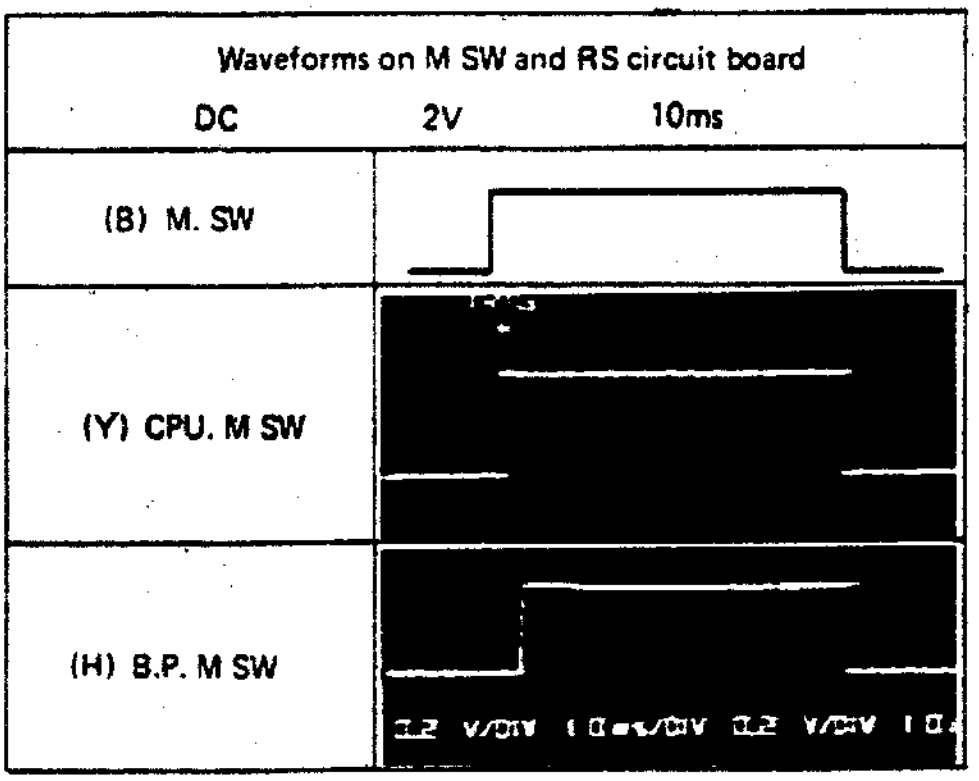


Waveforms on M SW and RS circuit board



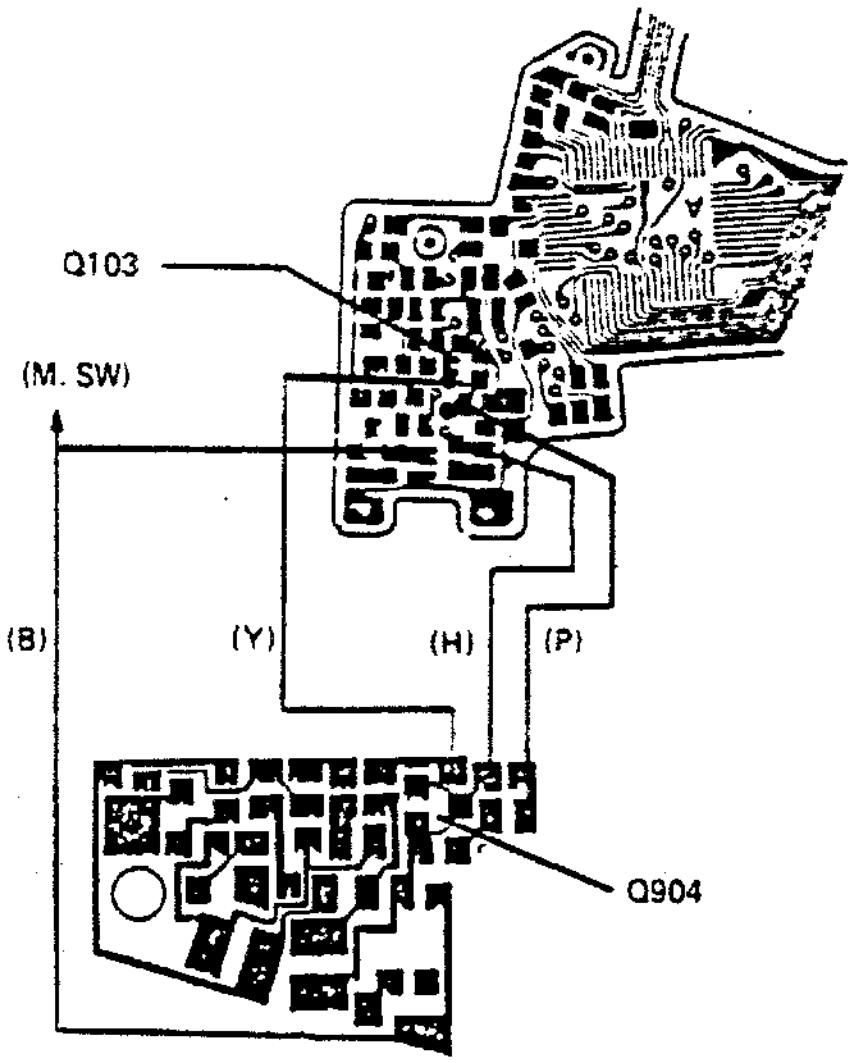
Waveforms on M SW and RS circuit board

DC 2V 10ms



- Cuase for no waveform

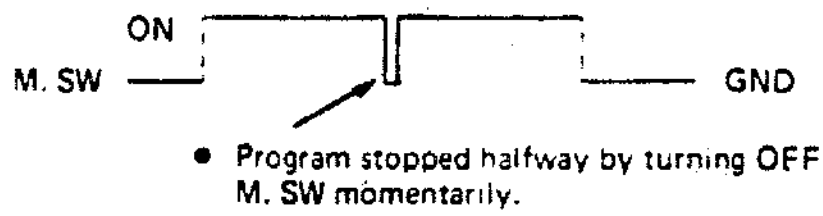
1. No waveform on M SW.
   - M SW defective
   - Lead wire broken or soldering defective
2. No waveform on both (Y) and (H)
   - RS circuit board defective
3. No waveform on (Y) only
   - Q103 defective
   - (P) lead wire broken
4. No waveform on (H) only
   - RS circuit board defective
   - (Y) or (H) lead wire broken



3. Check chattering of M SW

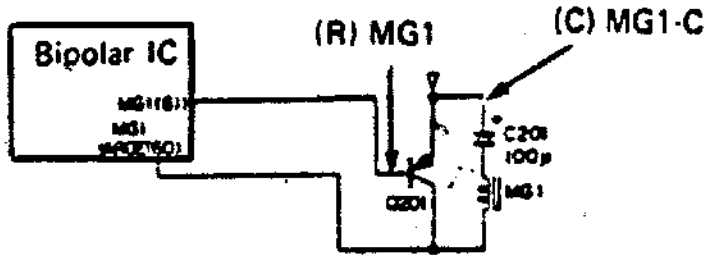
- Check procedures are the same as those described in 1 above.
- Observe waveform
- Shutter locked at the second and later operations.
- Contact pressure too low

Chattering waveform of M. SW

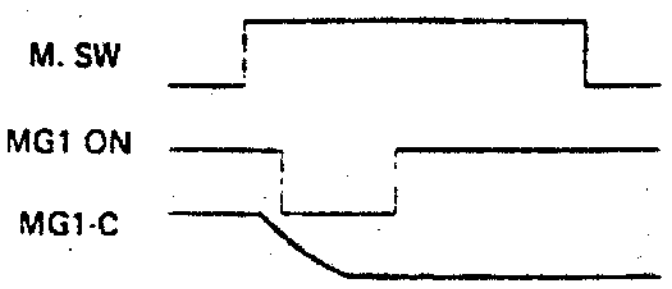


- Program stopped halfway by turning OFF M. SW momentarily.

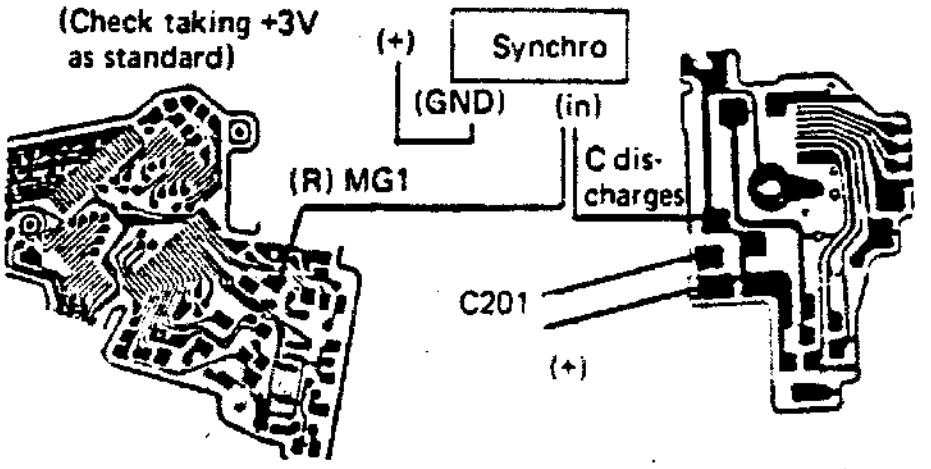
4. MG-1 OK?

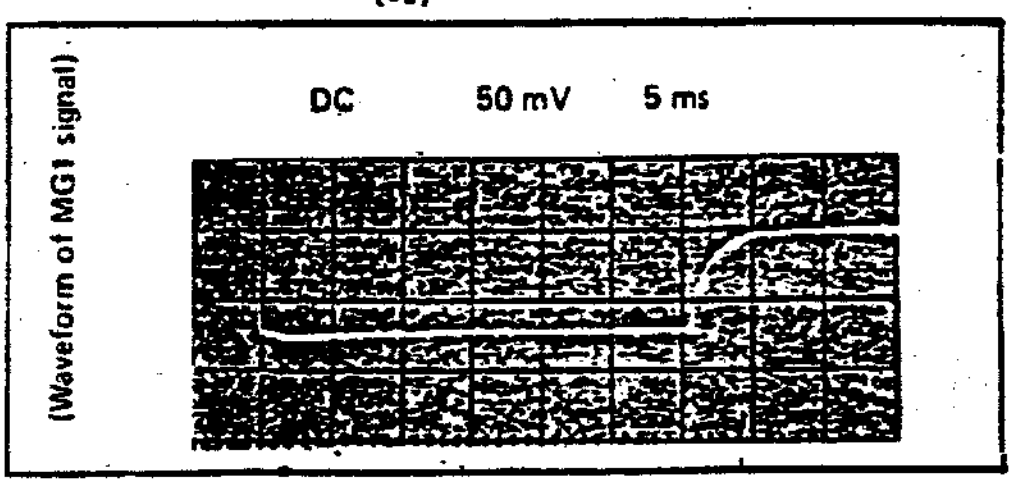


Time chart



Camera body





Check taking +3V as standard

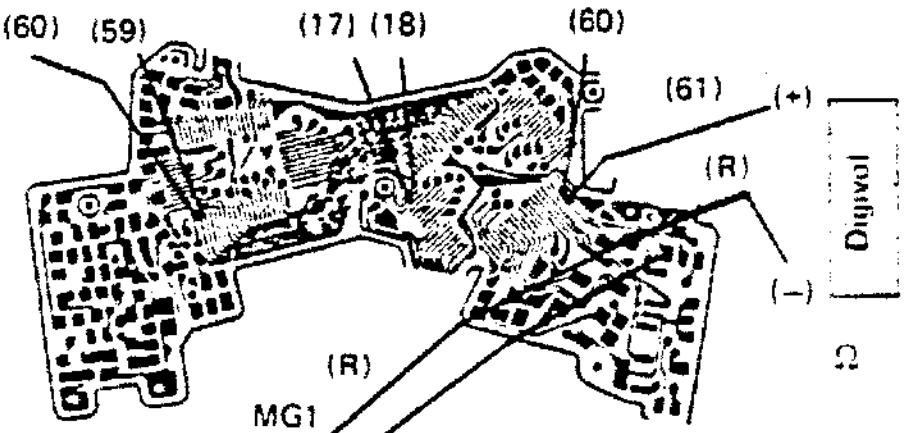
- Cause for no waveform,

  1. No waveform of MG1 signal
     - Soldering defective for B.P. leg No. 61
     - Wire breakage between rand (R) and B.P. No. 60
     - No MA or MB signal (CPU59; 60 – B.P 18, 17)

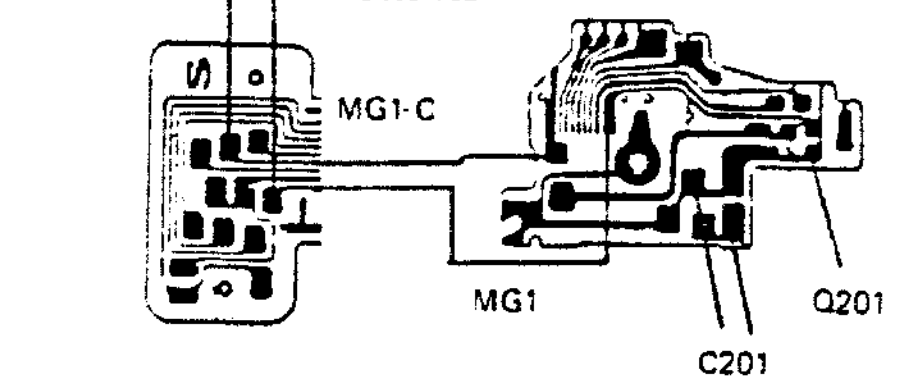
  2. No waveform of MG1-C (waveform of MG-1 signal observed by check 1 above)
     - C201 not charged
     - Q201 not conductive
     - MG1 lead wire (R) broken
     - MG1-C lead wire (W) broken
     - Pattern broken on TV circuit boad for MG1 and MG1-C.
     - B.P. pin No. 60 defective

- Main cause
  1. Q201 deteriorated
  2. C201 leg floated up
  3. MG1 lead wire (R) disconnected
  4. B.P. leg No. 60 broken

Locations to be checked when MG1 signal waveform is not observed

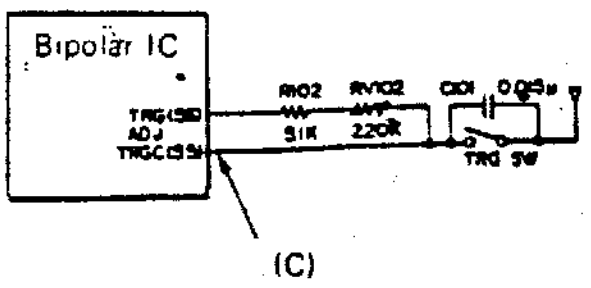


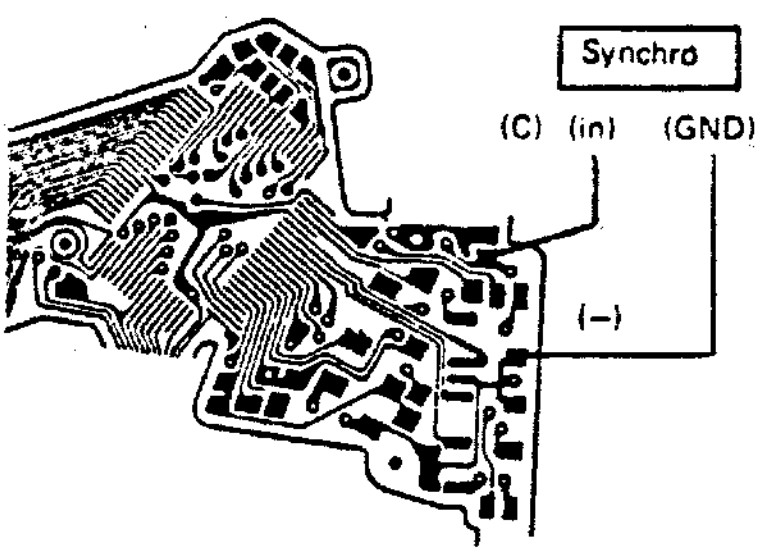
Locations to be checked when MG1-C signal waveform is not observed



5. Trg SW OK?

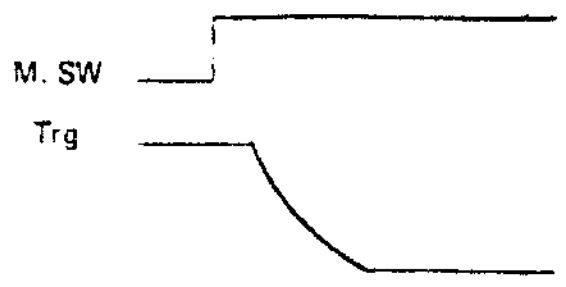
- Check in BULB mode.





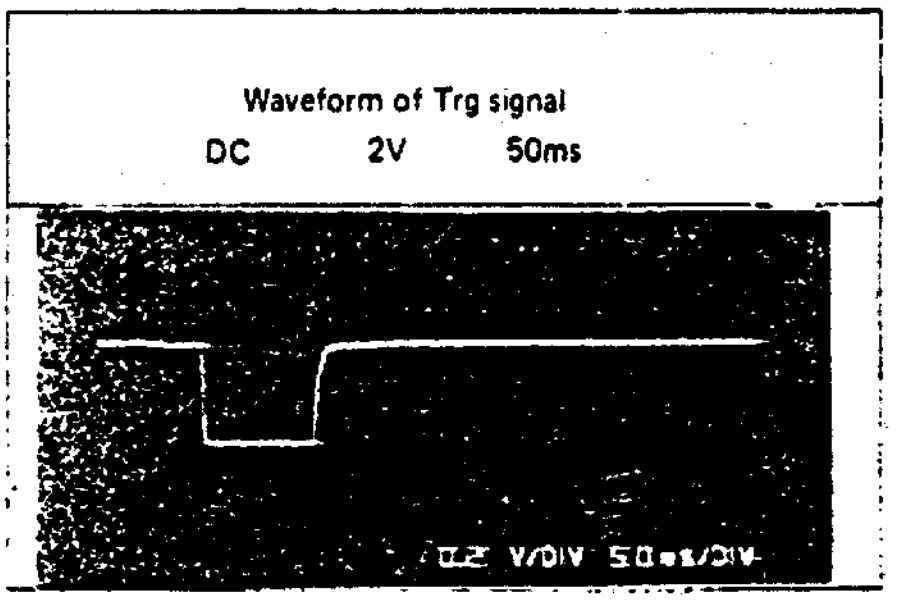
- Shutter is locked at second and later operations when Trg SW is defective. (In this case, PCV sounds lowly.)

Time chart (When Trg SW is normal)



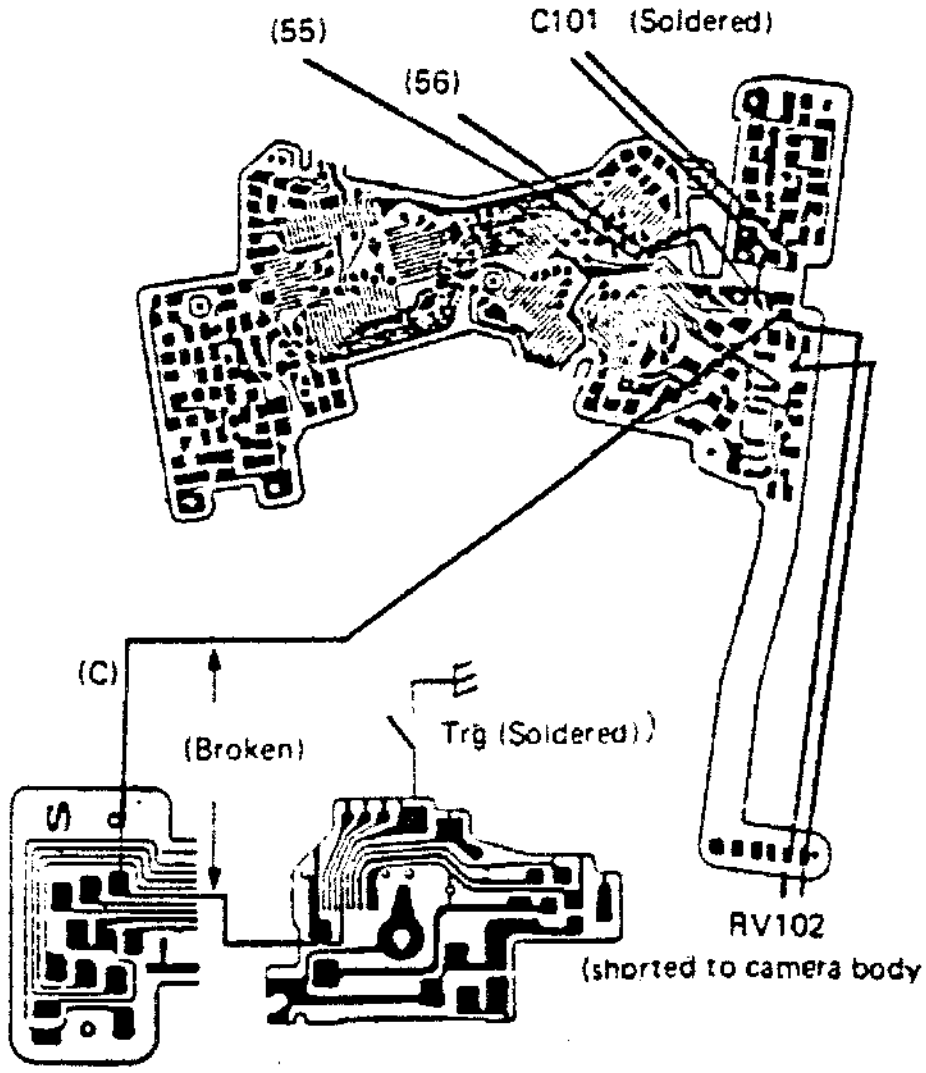
Waveform of Trg signal

DC 2V 50ms



- Cause for no waveform

- No waveform of Trg signal
  - Soldering defective for Trg SW
  - Pattern broken (on TV circuit board)
  - (C) lead wire broken or soldered improperly
  - Pattern broken (on M circuit board)
  - Improper soldering of B.P. leg No. 55 or 56
  - C101 or RV102 defective



6. Trg data latch circuit OK?

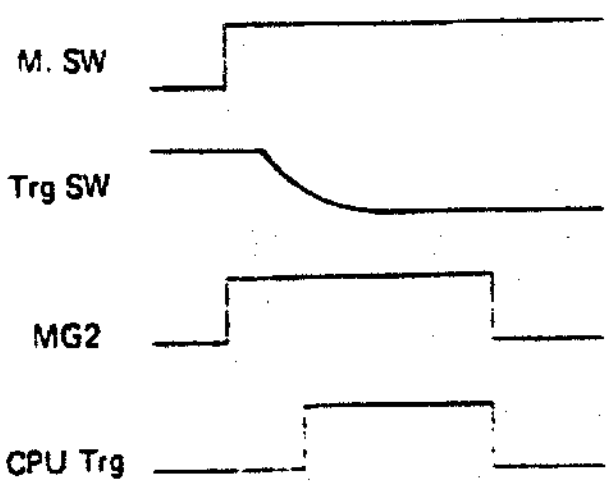
   (called also CPU Trg)

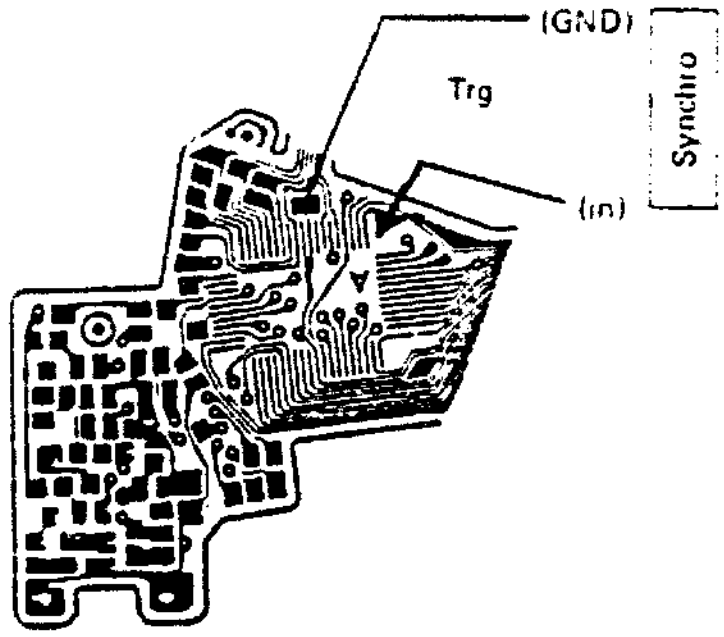
- Select BULB mode for checks.

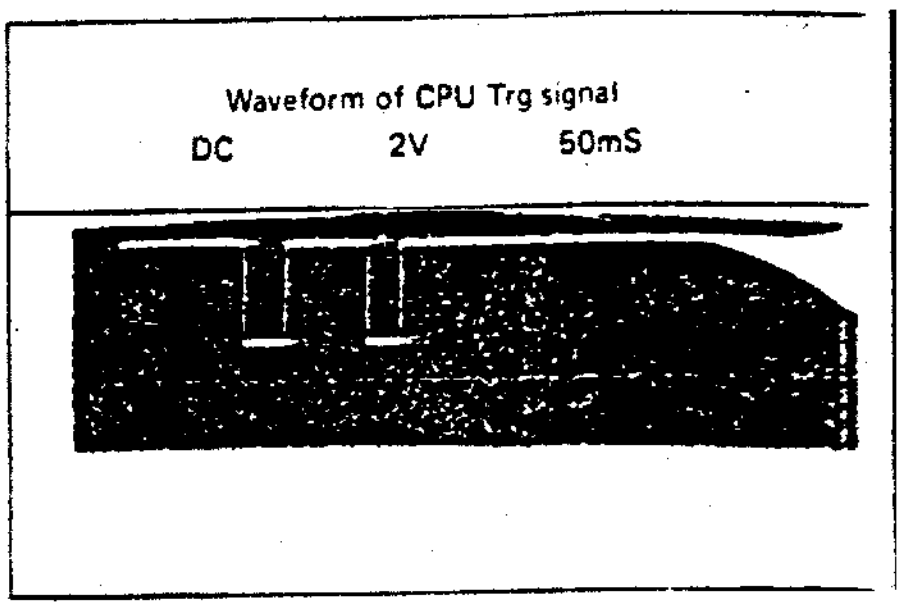
- No external circuit connected.

- Shutter is locked at the second and later operations when Trg datalatch circuit is defective.

Time chart (When Trg data latch circuit is normal)







- Cause for no waveform
- No waveform on CPU Trg

(a) No rise of waveform

(1) When Trg signal waveform is observable
- Pattern broken between CPU30 and B.P. 37
- IC leg improperly soldered CPU30, B.P. 37
- B.P. IC defective

(2) When Trg signal waveform is not observable
- Trg drive circuit defective

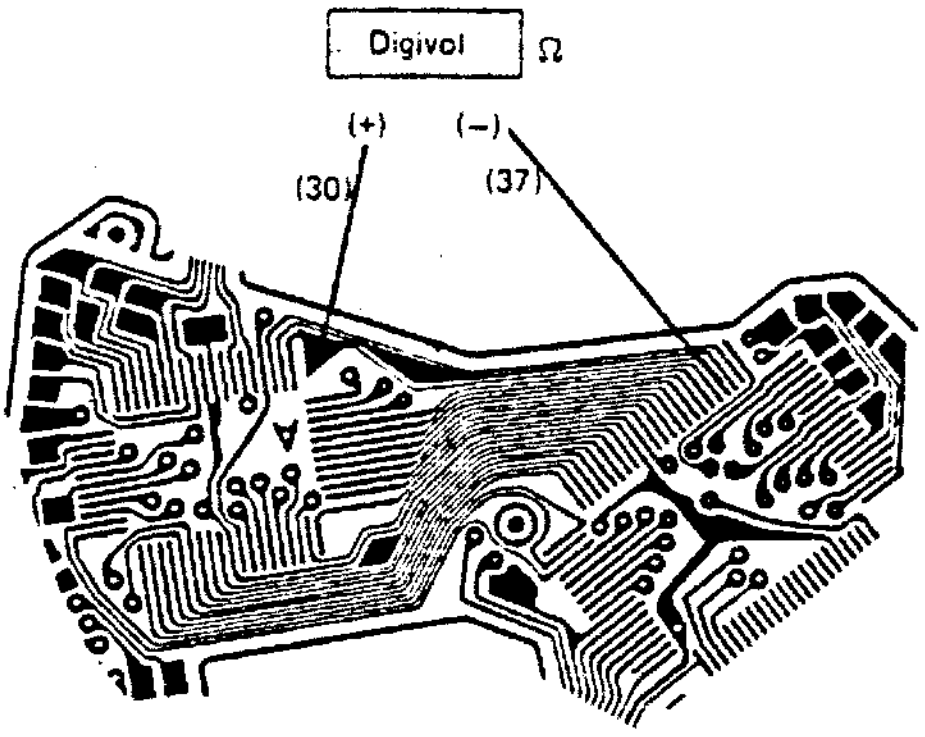
(b) No fall of waveform

(1) When MG2 signal is provided
When rise of waveform is observable
- B.P. IC defective (latch circuit defective)

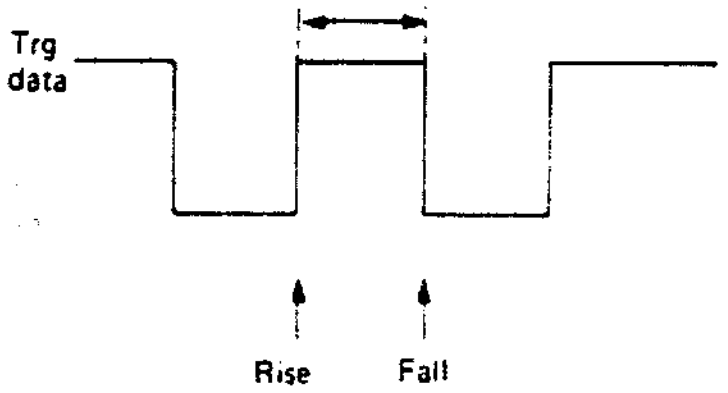
(2) When MG2 signal is not provided (shutter kept open)
When rise of waveform is observable
- B.P. IC defective (comparator)
- Input stage of head amplifier defective (Check output of head amplifier)

See page E-151.

(Check pattern for breakage)



Waveform of Trg data



(2) Shutter locked in both AUTO and MANUAL modes (Check with a digital voltmeter)

A. When indication is normal

1. Shutter locked from the first though indication normal within viewfinder

- Shutter locked upon releasing it even after resetting the camera A.M to B.C mode with selector lever
- Main cause: M SW, MG1 or RS circuit board defective

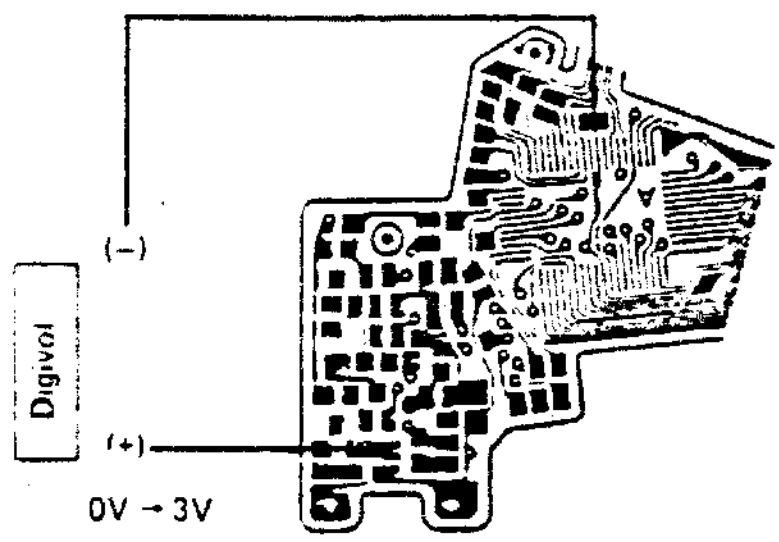
(1) Check of M SW

- 3V applied to land of M SW?
  - Release shutter with camera set in BULB mode.
  - M·SW or related part defective if voltage is lower than 3 V.
  - For checking M·SW by observation of waveform, see the preceding page (E-168).

(2) Check of RS circuit board

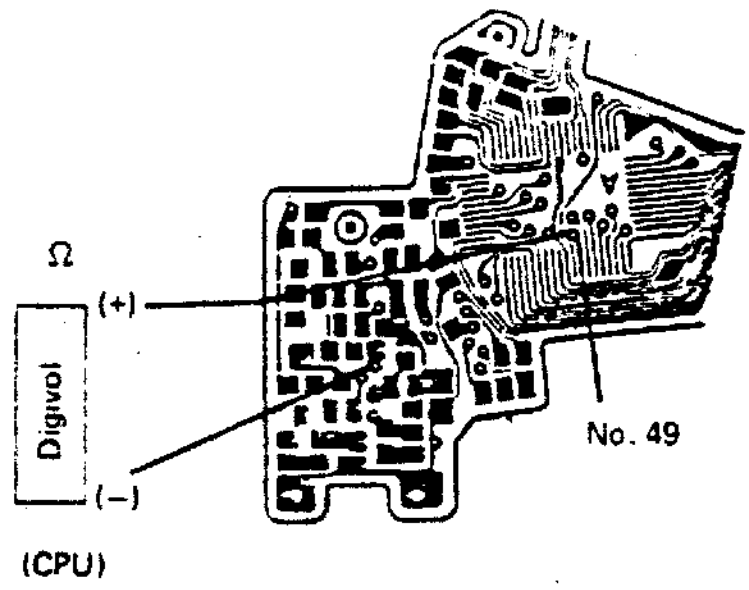
1. No MS signal input to CPU
   - Allow ± compensation to be indicated within viewfinder.
   - Release shutter. ± LCD stops flickering while M·SW is kept ON?
   - If not, MS signal is not provided to CPU.
   - When MS singal is not provided to CPU
     1. Wire broken between collector of Q10 and CPU pin No. 49
     2. CPU pin No. 49 soldered improperly.

Check of M·SW



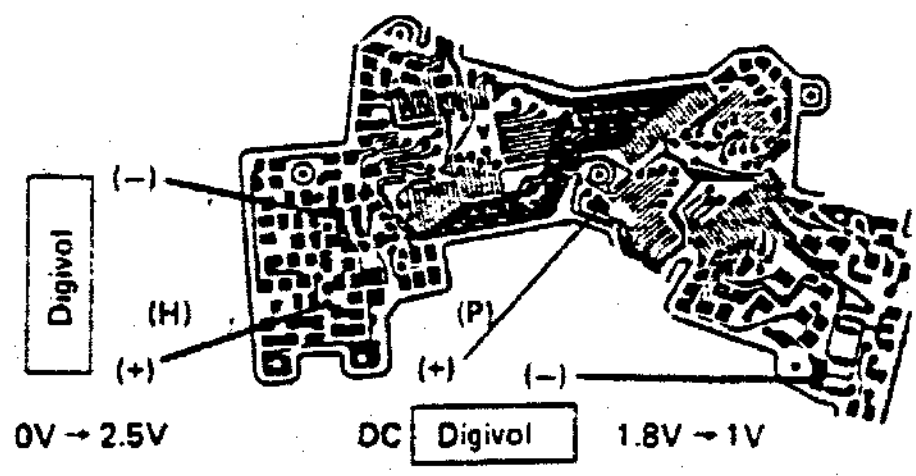
Check of MS signal to CPU

- OK when ± compensation LCD stops flickering while M SW is turned ON.



2. No MS signal input to B.P.
   - Vref switchable from 1.8 to 1 V?
   - Measure voltage on (P) land.
   - Or measure voltage on (H) land.
     0 V → 2.5 V

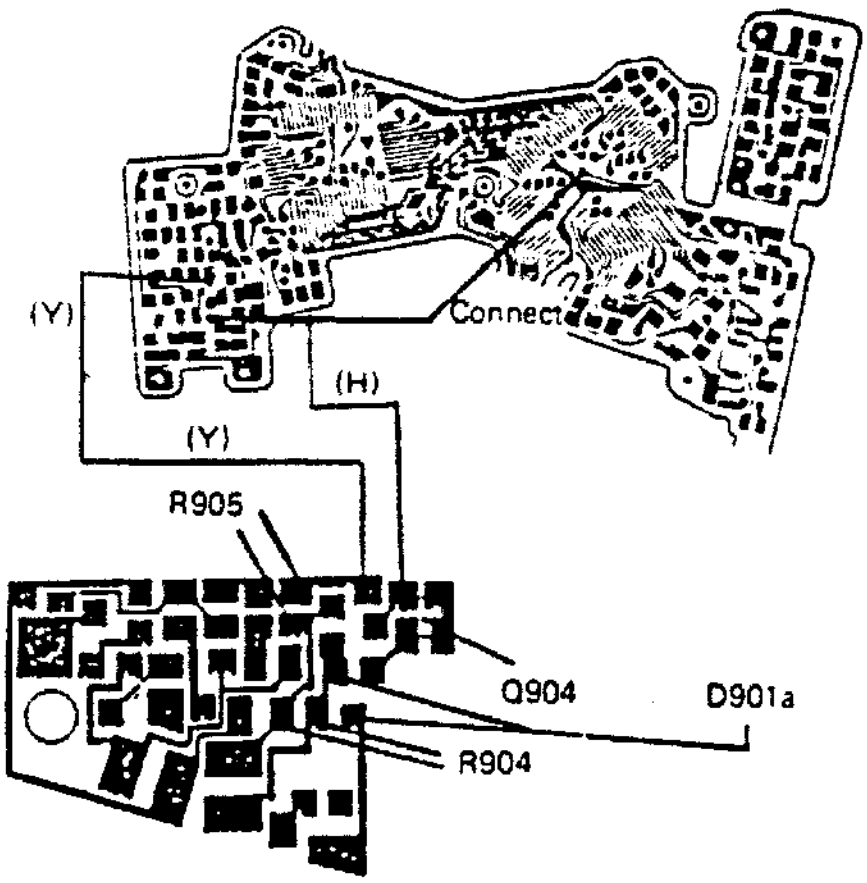
Check of MS signal to B.P.



- When no signal is provided to B.P. only

1. (H) lead wire broken or improperly soldered.
2. (Y) lead wire broken or improperly soldered.
3. Reset circuit defective
   Q904, R904, R905, R132, D901a

No signal to B.P. only

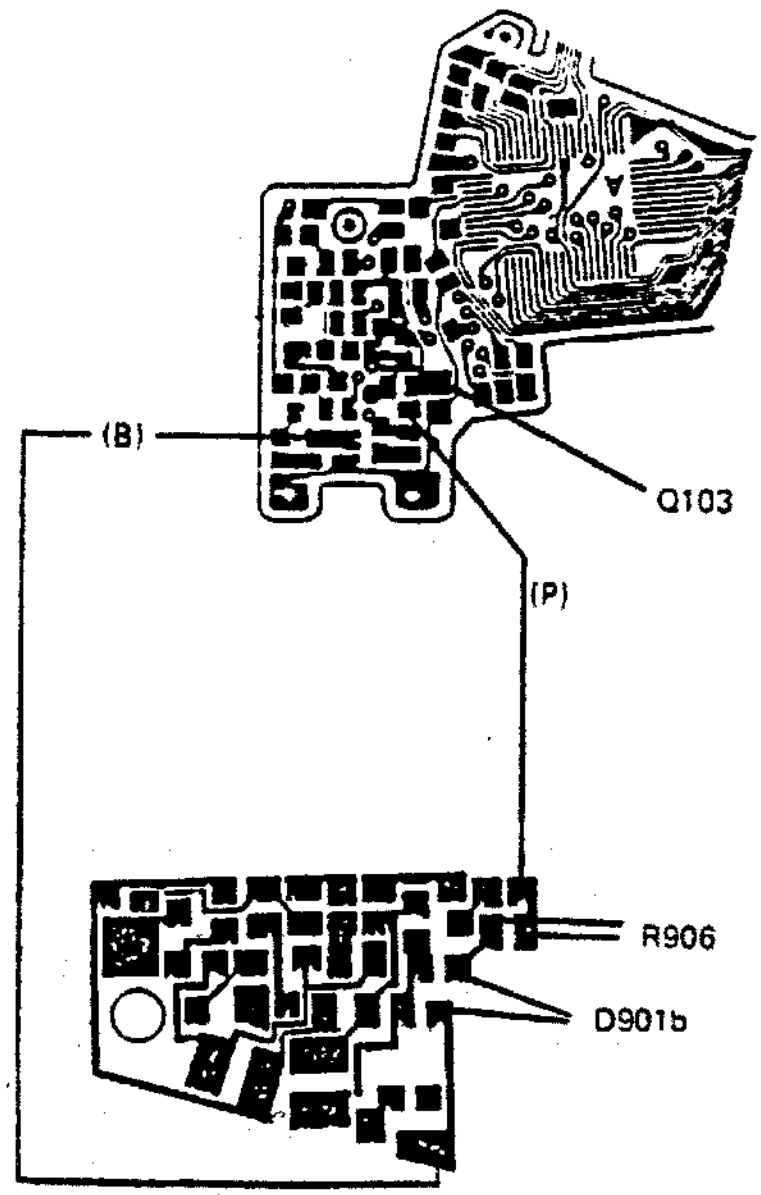


3. No signal to CPU and B.P.

- No signal to CPU and B.P.

1. Q103 broken
2. (P) lead wire broken or improperly soldered.
3. R906 or D901 defective
4. (B) lead wire broken or improperly soldered.

No signal input to CPU and B.P.



(3) Check of MG1 circuit

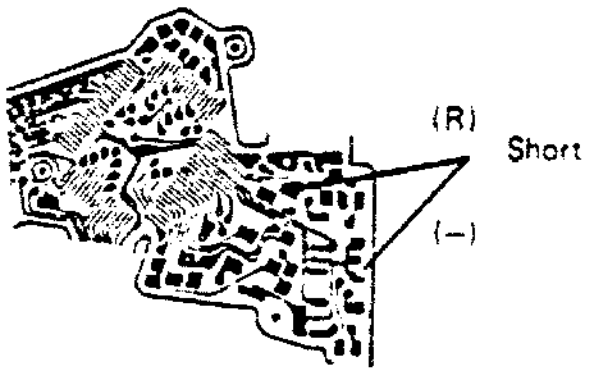
- Check MG-1 circuit whether or not it is normal.
- Check procedures

  Camera in wound condition

  Short MG1 (R) lead wire rand to (−) power supply with tweezers.

  MG1 OK when it is energized with a click sound.

Check of MG1



- When MG1 is not energized
- Short MG1-C (W) lead wire land to body (+) with tweezers.

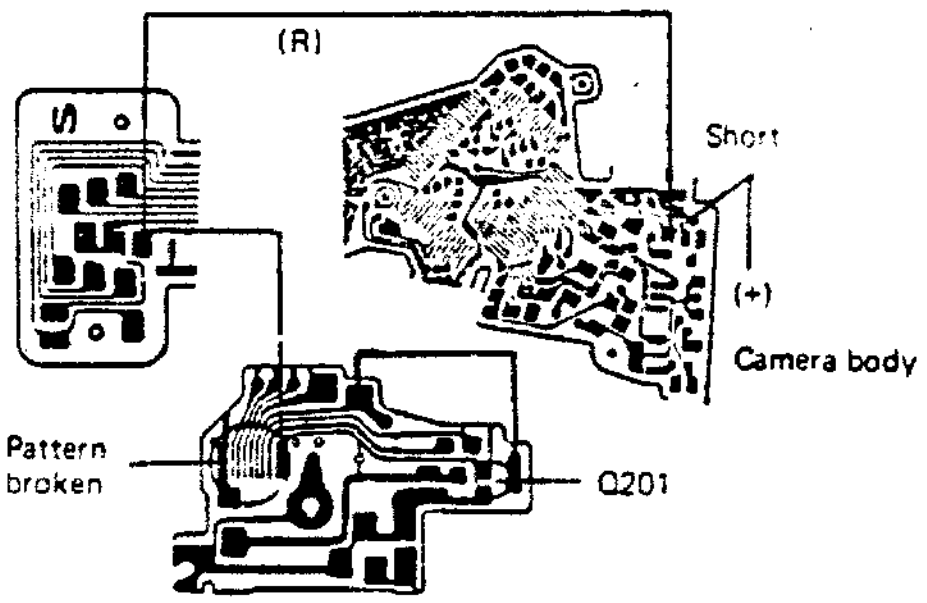
1. When MG1 is energized with a clicking sound

   (R) lead wire broken or improperly soldered.

   TV connecting pattern broken.

   Q201 defective

MG1 ON



2. When MG1 is not energized

   (Check MG1-C circuit)

(a) Short (−) side of C201 to camera body. When MG1 is energized with a clicking sound,

   (W) lead wire broken or improperly soldered.

   TV connecting pattern broken.

(b) When MG1 is not energized

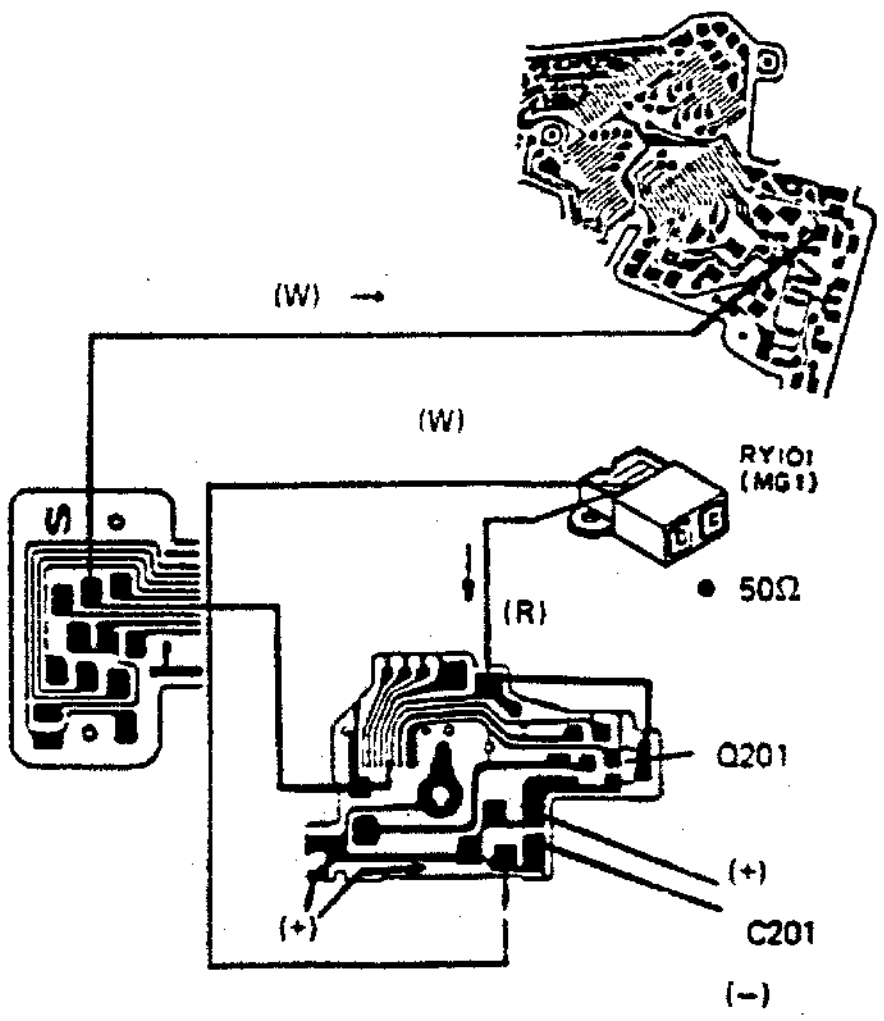
   Check voltage of C201.

   It should normally be 3 V.

   Check MG1 for wire breakage.

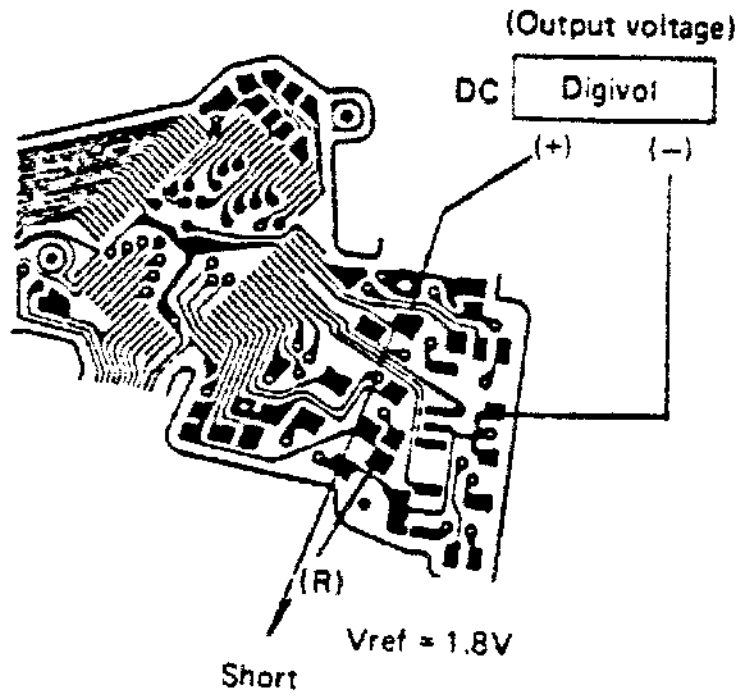
   Resistance should normally be 50 Ω.

MG1-C



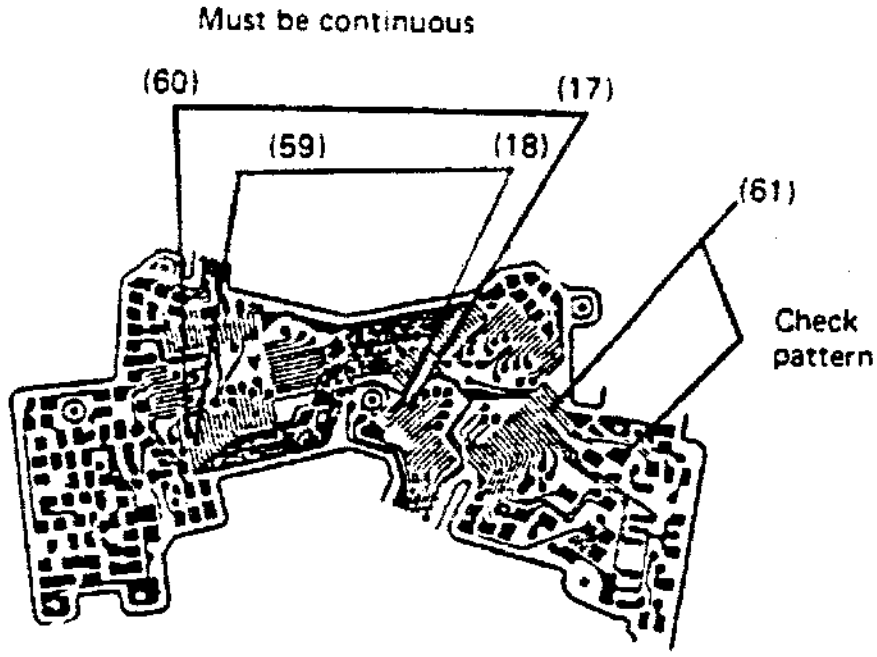
(4) Check of MG1 output voltage

- Voltage variable on land of MG1?
- Check procedures (camera in wound condition)
  1. With shutter kept in locked condition, short land (R) of MG1 to Vref = 1.8 V.
     ○ OK when shutter is released with a clicking sound.



  2. Check voltage on land (R) of MG1.
     2.6 V → 2.5 V: OK
     Release shutter (at low speed)

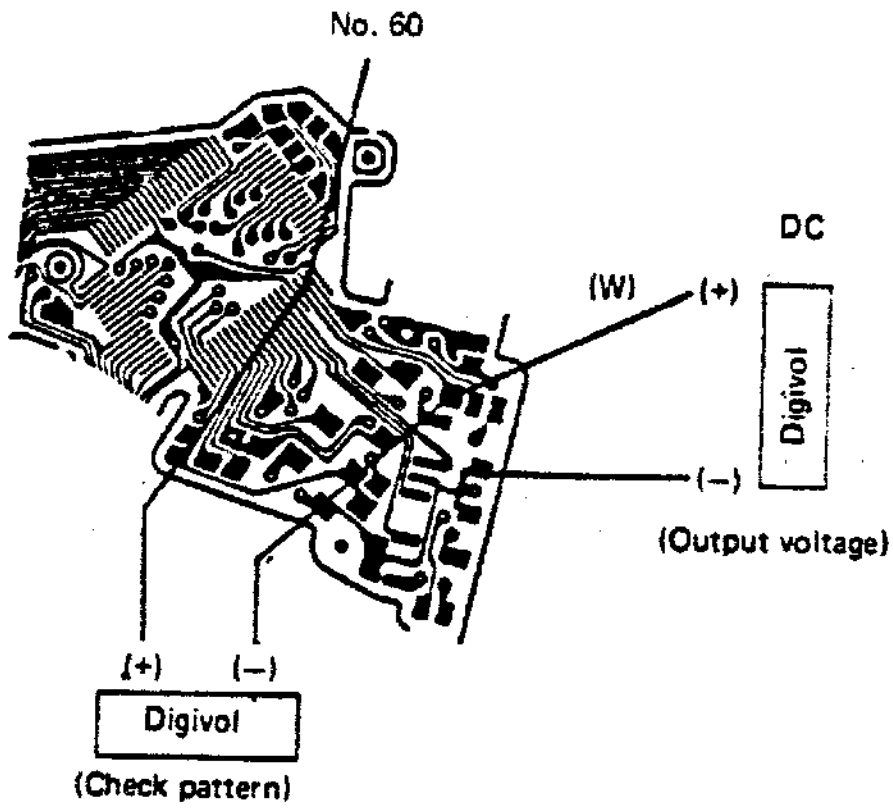
- Voltage invariable
  1. Pattern broken
  2. B.P. pin No. 61 improperly soldered.
  3. No MA or MB signal from CPU
     (MA = 0.5 V, MB = 0 V)
     CPU legs No. 59 ($\overline{MA}$) and No. 60 ($\overline{MB}$)



(5) Check of MG1-C output voltage

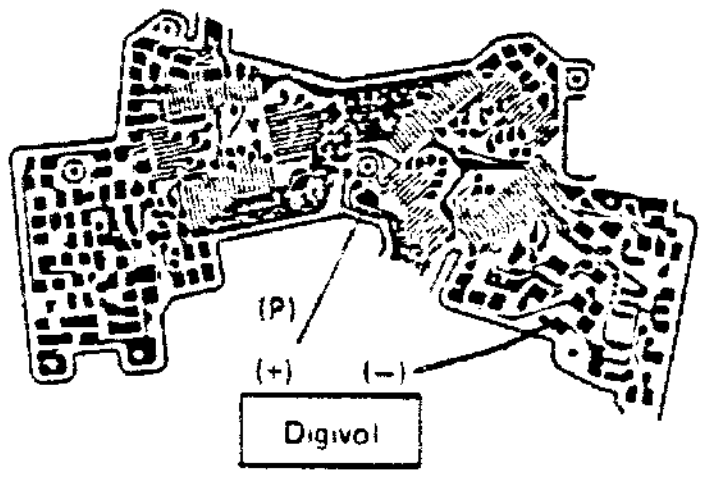
- Check procedures
- Check voltage on (W) of MG1-C
  0 V → 2.3 V
  ○ Check voltage variation while releasing shutter at low speed.

- Voltage invariable
  1. Pattern broken
  2. B.P. pin No. 60 improperly soldered.
  - See (3)-2-(a) on the preceding page.



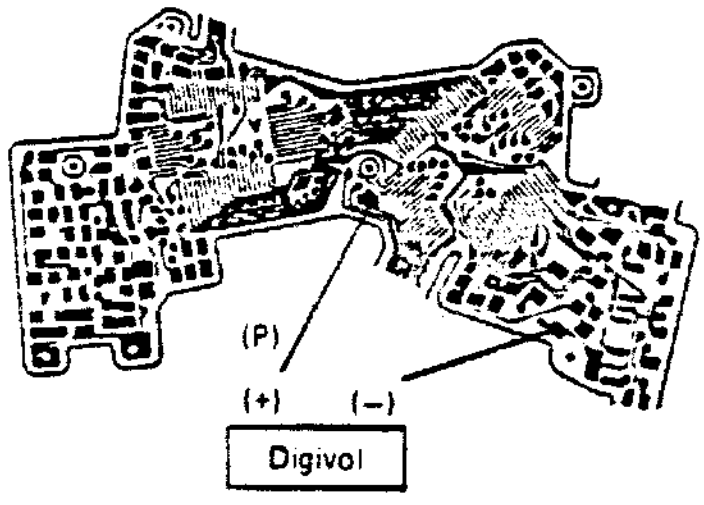
(6) RV101 shorted

- Check procedures
  - Check voltage of 1.8 V/1 V on land.
  - When M SW is turned ON
    - 1.8 V → 1 V: OK
      0 V
      RV101 shorted



(7) No switching of 1.8 V/1 V on terminal when M·SW is turned ON

- 1.8 V is not switched to 1 V after turning ON of M·SW.
- IC defective



2. Shutter locked at second and later operations

- After resetting camera, shutter can be released normally at the first operation but locked at the second and later operations.
- This symptom to halfway stop of the program.
- This symptom is traced to a trouble in MG-1 drive circuit or later stage.

(1) Check of Trg

(a) Trg voltage variable?

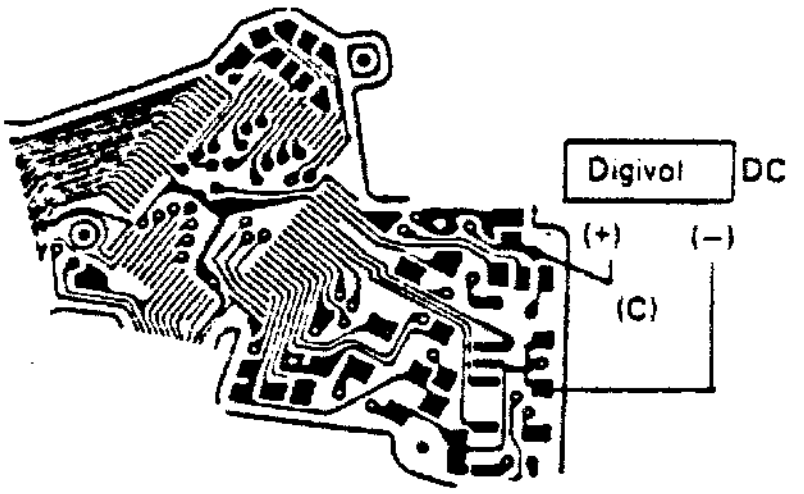
- Check procedures
  - Disconnect (C) lead wire.
  - Check voltage on (C) lead wire.
    3 V → 0 V: OK
  - Release shutter in BULB mode.
  - Voltage should desirably be checked with a synchroscope.

- Voltage invariable
  1. Lead wire or pattern broken
  2. Trg SW broken or improperly soldered
  3. Trg SW shorted to camera body

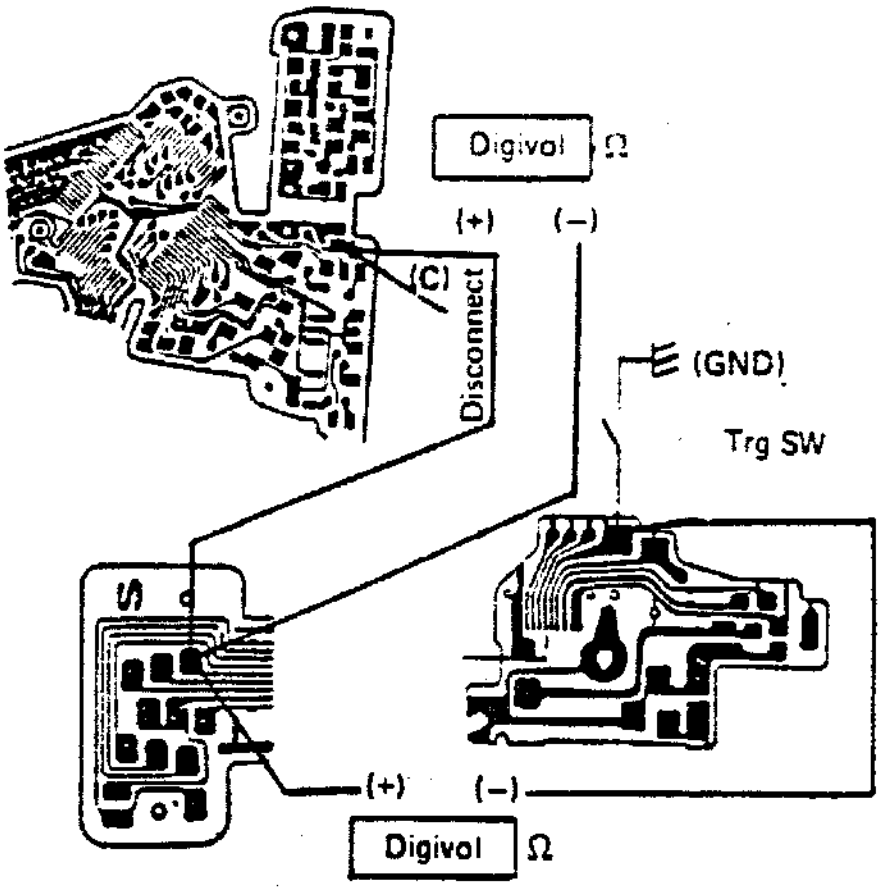
(b) Trg output (on B.P. No. 80) and Trg data output voltage variable?

- Before check, make sure that Trg voltage (mentioned in (1)-(a) above) is normal.
- 1. Check voltage on B.P. No. 80 (R127 land).
  2. Check voltage on CPU Trg land.
  0 V → 3 V in 1 and 2 above: OK
- Release shutter in BULB mode.
- Voltage should desirably be checked with a synchroscope.

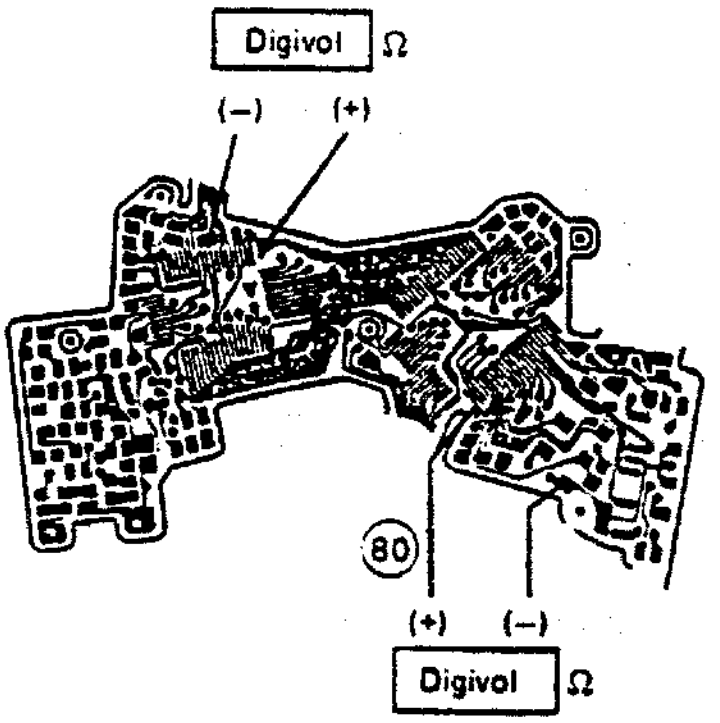
Check of Trg voltage



Lead wire C101 Pattern check



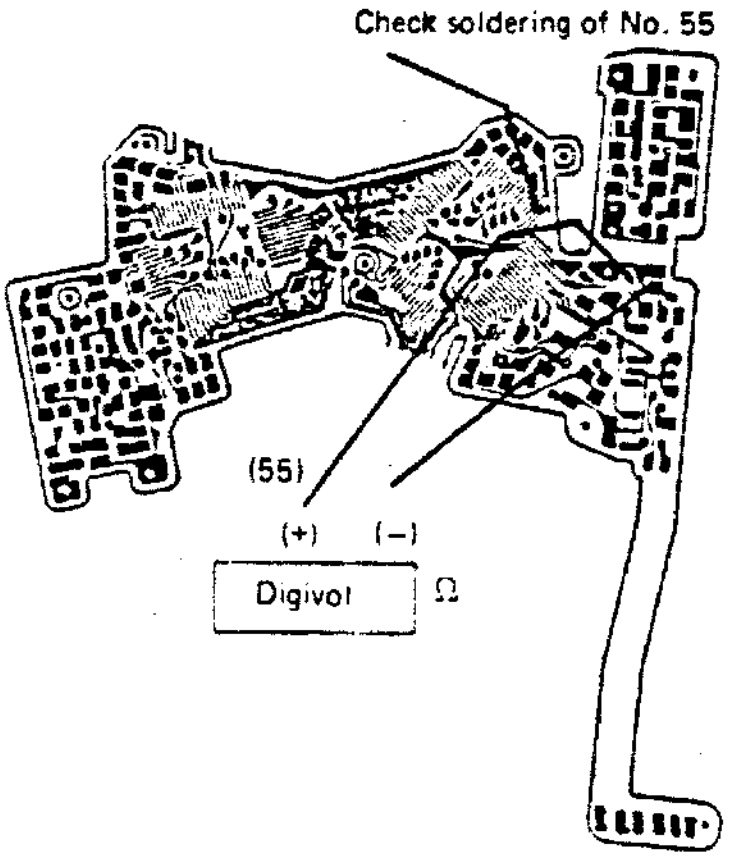
Checks of Trg output and Trg data output



1. When neither Trg output nor Trg data output is variable
   1. Pattern broken
   2. B.P. No. 55 improperly soldered
   3. B.P. IC defective

2. When either voltage is variable
   - When no Trg output (B.P. No. 80) is provided
     B.P. No. 80 or IC defective
   - When no Trg data output is provided
     B.P. No. 37 or IC defective
     CPU No. 30 defective
     Pattern broken
   - See (2) below

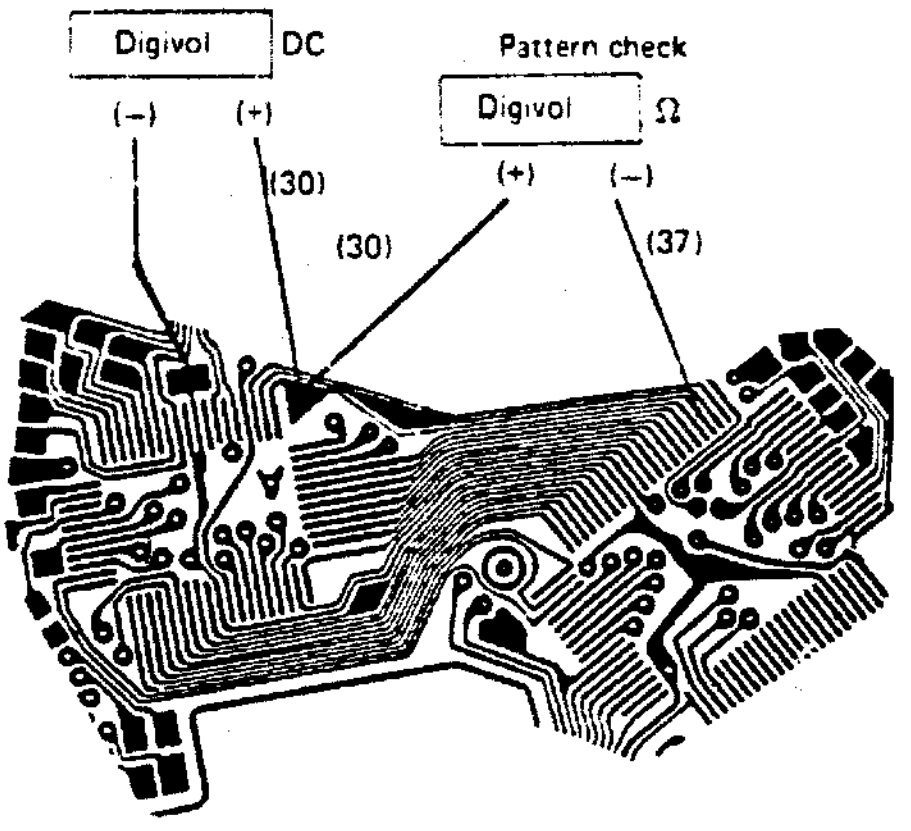
Check in (b)



(2) Check of Trg data voltage

- When output is provided to B.P. No. 80 and output is not provided to Trg data No. 37 in (1)-(b)-2 above.
  1. B.P. No. 37 defective
  2. CPU No. 30 defective
  3. Pattern broken
  4. B.P. IC defective

Check in (2)



(3) Others
1. Comparator circuit defective (B.P. defective).
2. When program stops halfway, shutter is locked at the second and later operations.

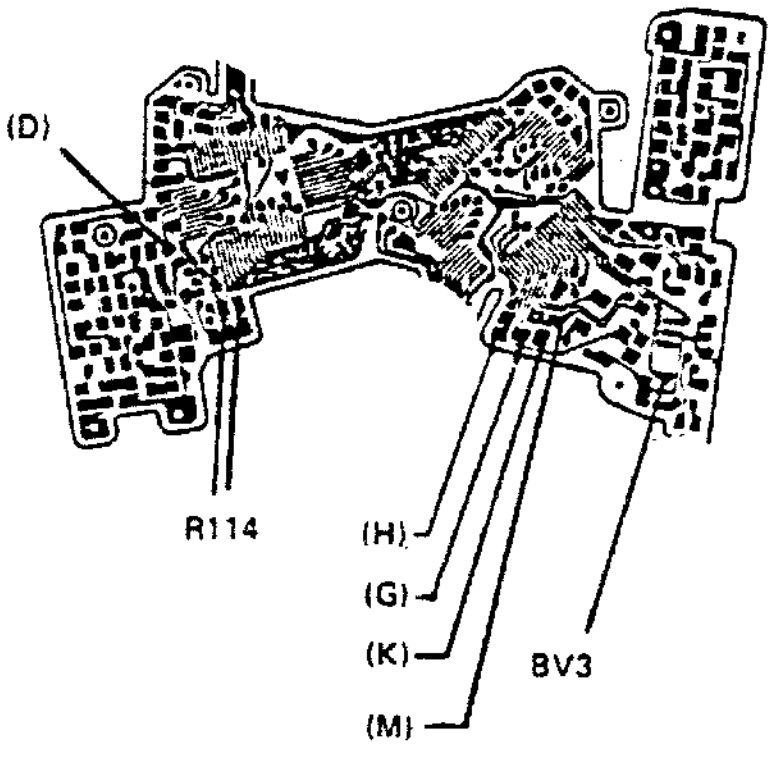
B. Indication also abnormal

- In this case, data input circuit is also defective.
- Correct indication referring to "LCD Indication Abnormal".

(Reference)

1. System clock circuit defective
   - R114 broken or shorted
   - See page E-118.
2. BV circuit defective
   - BV3 shorted to (−) terminal
   - See page E-118.
3. TV AV circuit defective
   1. (H) lead wire shorted to camera body.
   2. (K) lead wire shorted to camera body.
   3. (G) lead wire shorted to camera body.
   4. (K) and (M) lead wire shorted to each other.
   - See page E-117.
4. CV SV circuit defective.
   - (D) lead wire shorted to camera body.
5. For other symptoms, refer to "Electric System Dead".
   - See page E-95.

System clock circuit or data input circuit defective



(3) Shutter locked in AUTO mode only

- B.P. IC defective

(4) Shutter locked in MANUAL mode only

- B.P. IC defective

3-4 Shutter Left Open

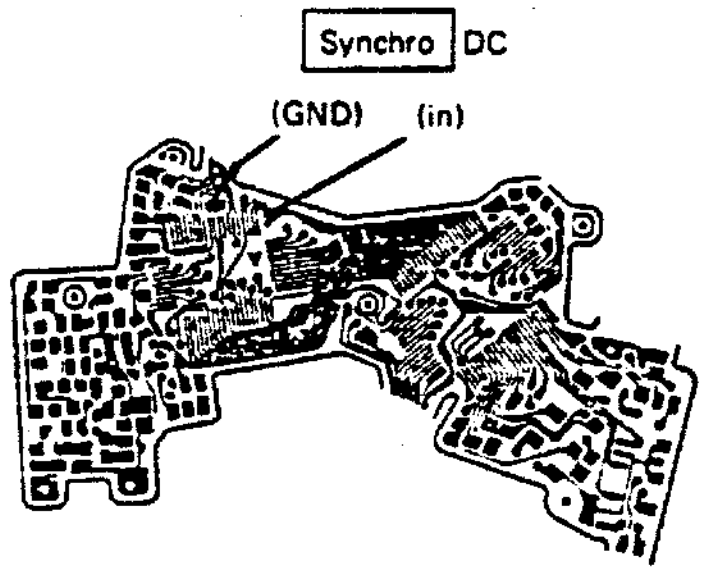
- Check whether or not indication is normal.
- When indication is abnormal, correct it referring to "LCD Indication Abnormal".

- Preparations
  1. Measuring instruments: ⊃ Digital voltmeter or circuit tester
     ⊃ Synchroscope (storage)
  2. Mode: ⊃ AUTO or MANUAL
  3. Others ⊃ Release shutter for checks.

(1) Shutter Left open in both AUTO and MANUAL modes

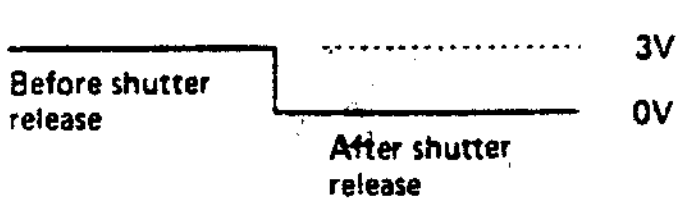
- Trg data signal provided?
  - Check procedure
    Observe waveform on trigger rand of CPU with a synchroscope (or check voltage with a digital voltmeter).

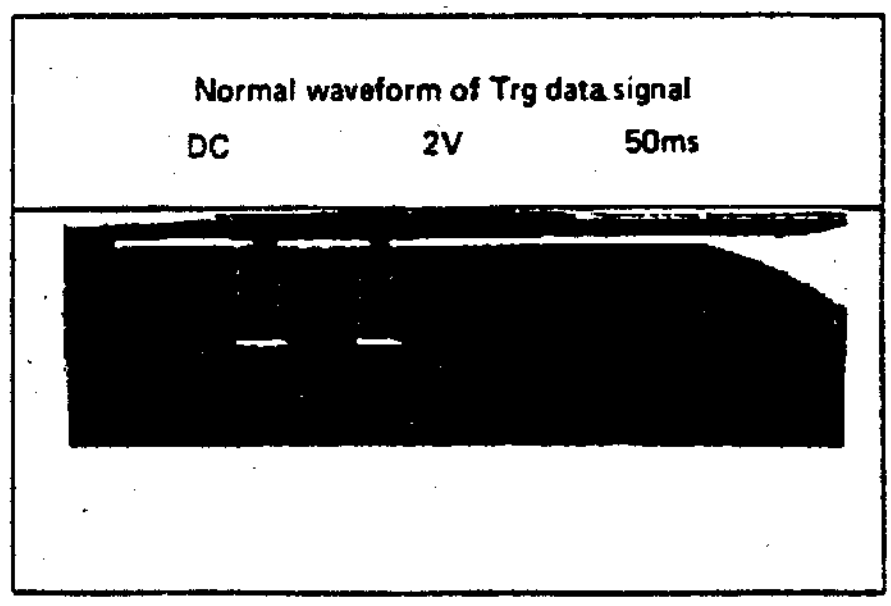
Waveform of Trg data signal



A. When Trg data signal output is not provided

- Trg data kept at L level after releasing shutter.
- In this case, Trg SW or related part defective.





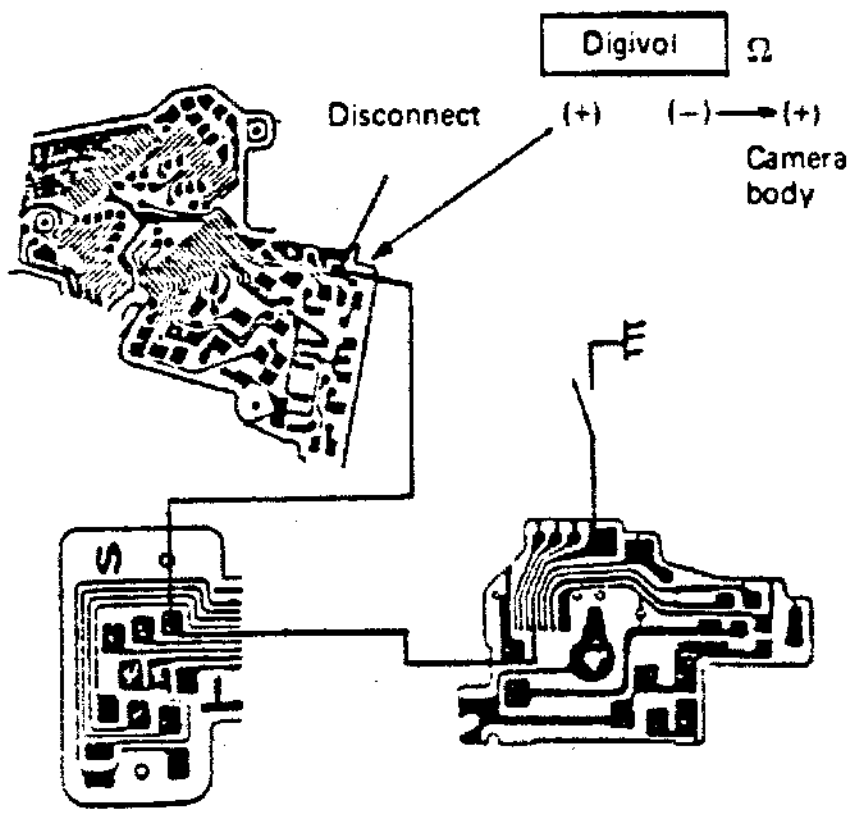
(1) Trg SW or related part shorted

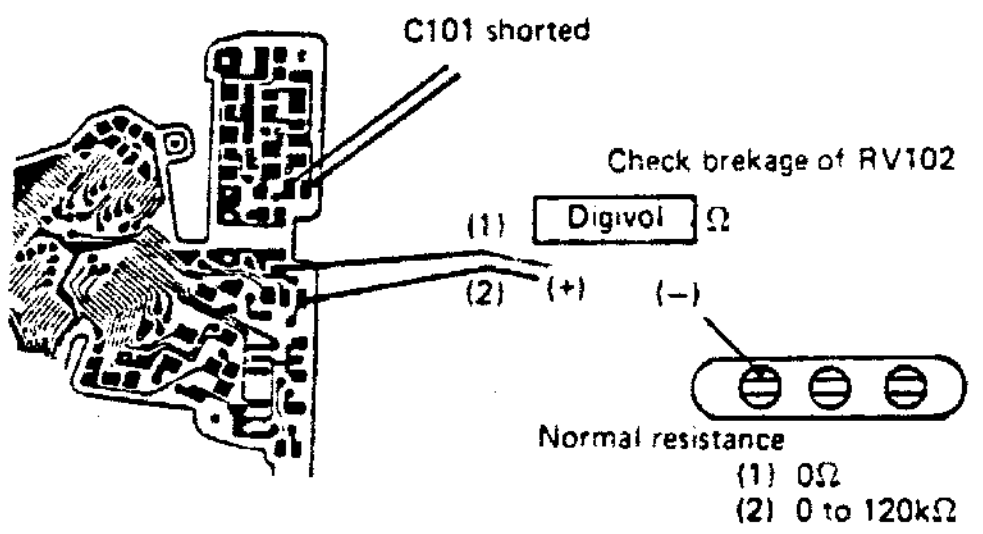
- Check procedures
  - Disconnect (C) lead wire.
  - Set camera in BULB mode.
  - Resistance between camera body and (C) lead wire should normally be:
    1. ∞ before film winding.
    2. 0Ω after film winding.
    3. Varied from 0Ω to ∞ upon releasing shutter.
- When resistance is 0Ω before film winding
  Trg SW kept ON

(2) C101 shorted

- Disconnect and check C101.
- Or disconnect C101 and release shutter. When shutter is closed, C101 is defective.

Trg SW and related parts



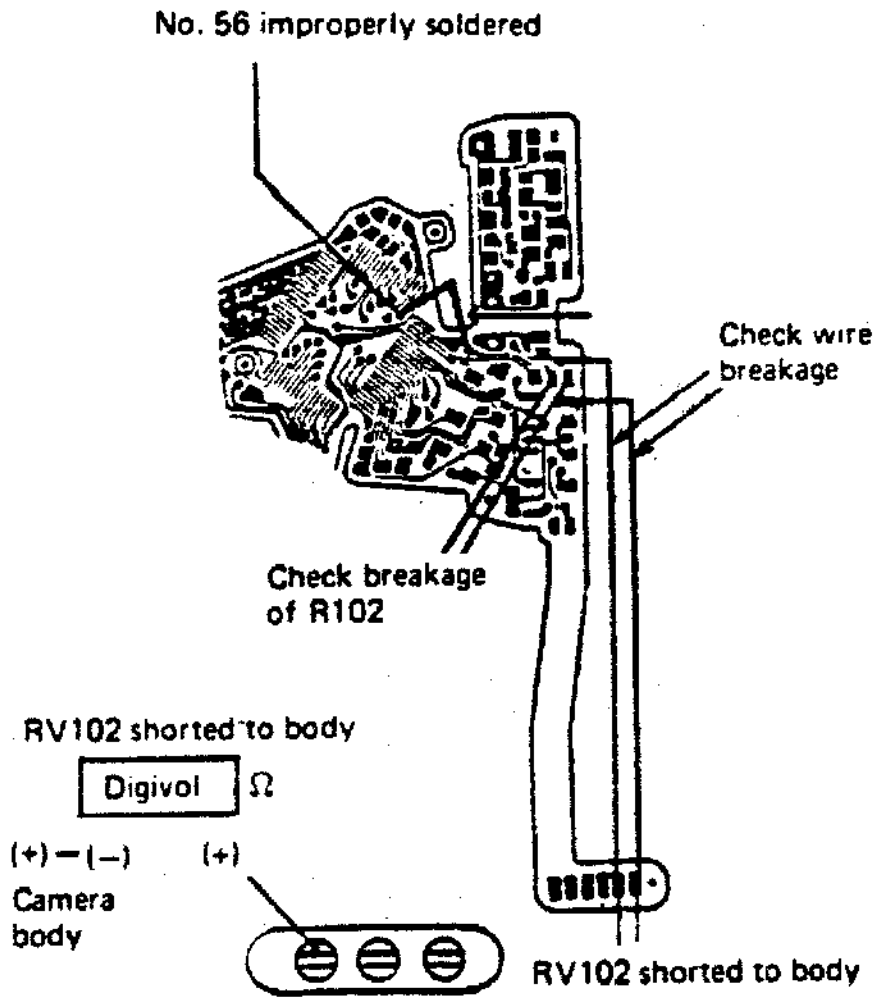


(3) Wire broken in Trg adj. circuit

- Check procedure
  Check continuity with a digital voltmeter.
  1. No. 56 improperly soldered.
  2. R102 broken
  3. RV102 broken (See drawing on upper right side)
  4. Check pattern

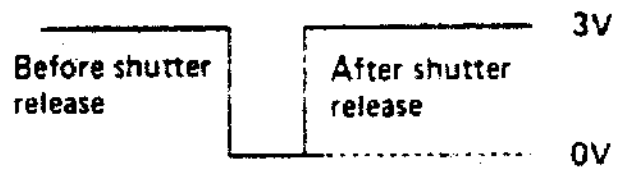
(4) RV102 shorted to camera body

- Resistance between camera body and RV-102 should normally be ∞
- Resistance of 0Ω indicates shorting.



B. Integral end signal not inputted

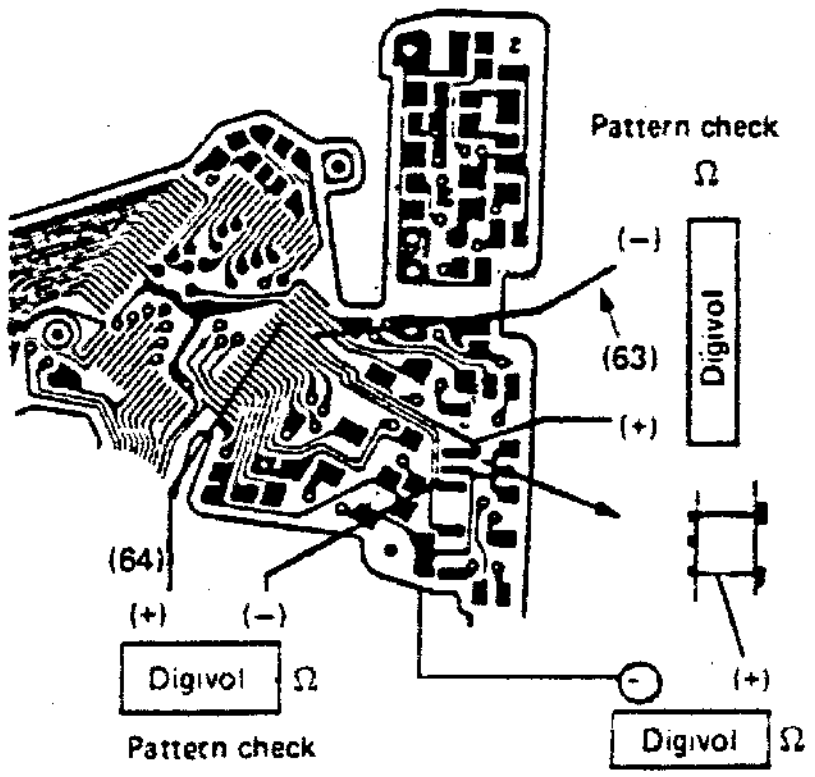
- Main comparator defective (IC defective)
- Upon releasing shutter, Trg data signal drops from H to L level and rises to H level. Then, it does not drop to L level.



(1) RV103 broken or contact floated up

(2) Pattern broken

(3) B.P. IC defective



Check RV103 contact for floating

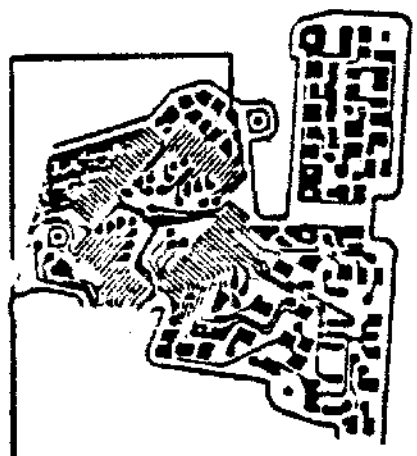
C. When normal waveform of Trg data signal is observed

- MG2 or related part defective

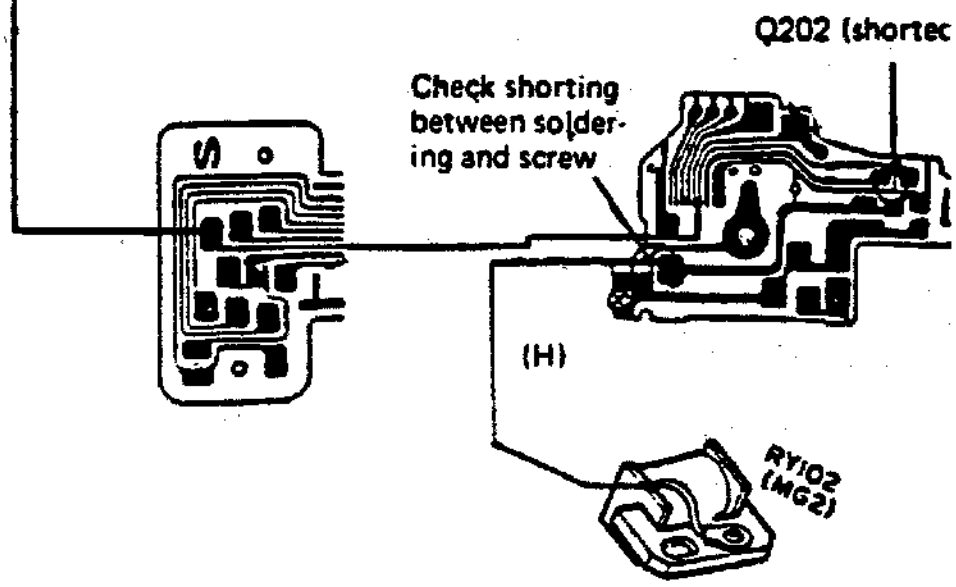
(1) (H) lead wire shorted to camera body.

(2) Q202 shorted or broken.

(3) Soldering of (H) lead wire from MG2 shorted to serew.



(H) lead wire shorted to camera body



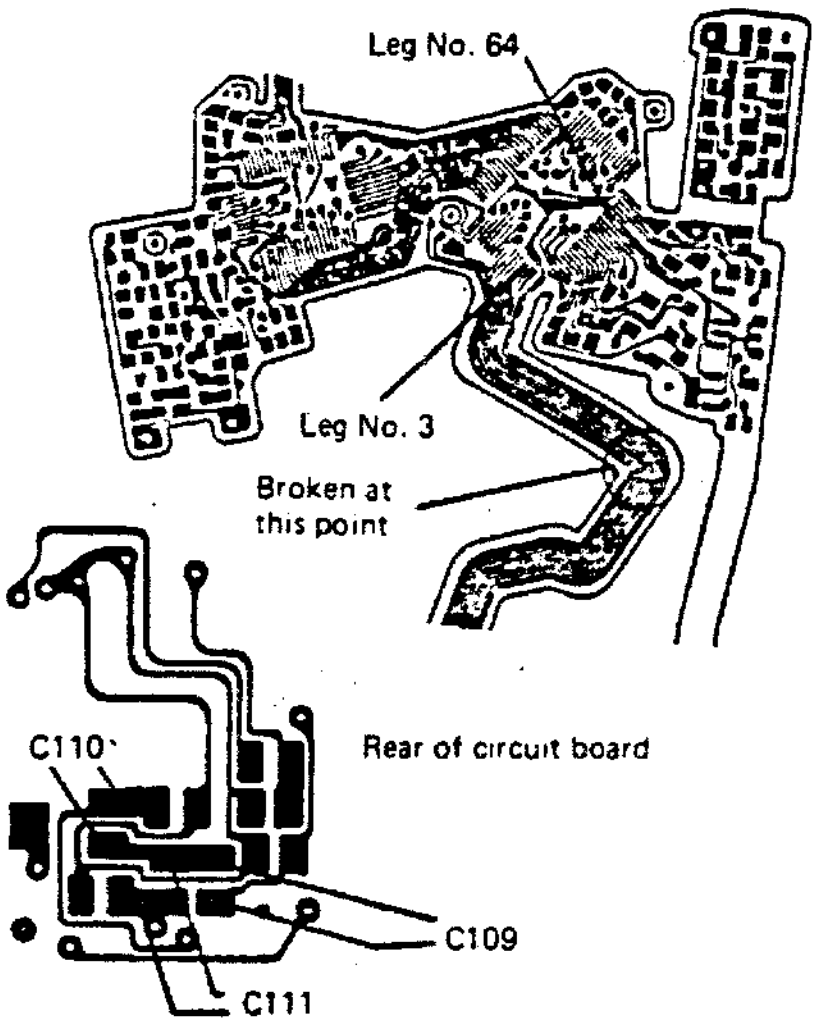
(2) Shutter left open in AUTO mode only

- Trouble caused when integral input voltae is not provided.

  Main cause
  1. Flexible wire broken on M circuit board
  2. B.P. leg No. 3 defective (broken or improperly soldered)
  3. B.P. leg No. 64 defective
  4. B.P. leg No. 80 defective
  5. Head amplifier IC leg No. 10 or 14 defective

- When shutter kept open at low speed
  1. C109 or C110 improperly soldered.
  2. B.P. leg No. 4 or 5 improperly soldered

Shutter kept open in AUTO mode

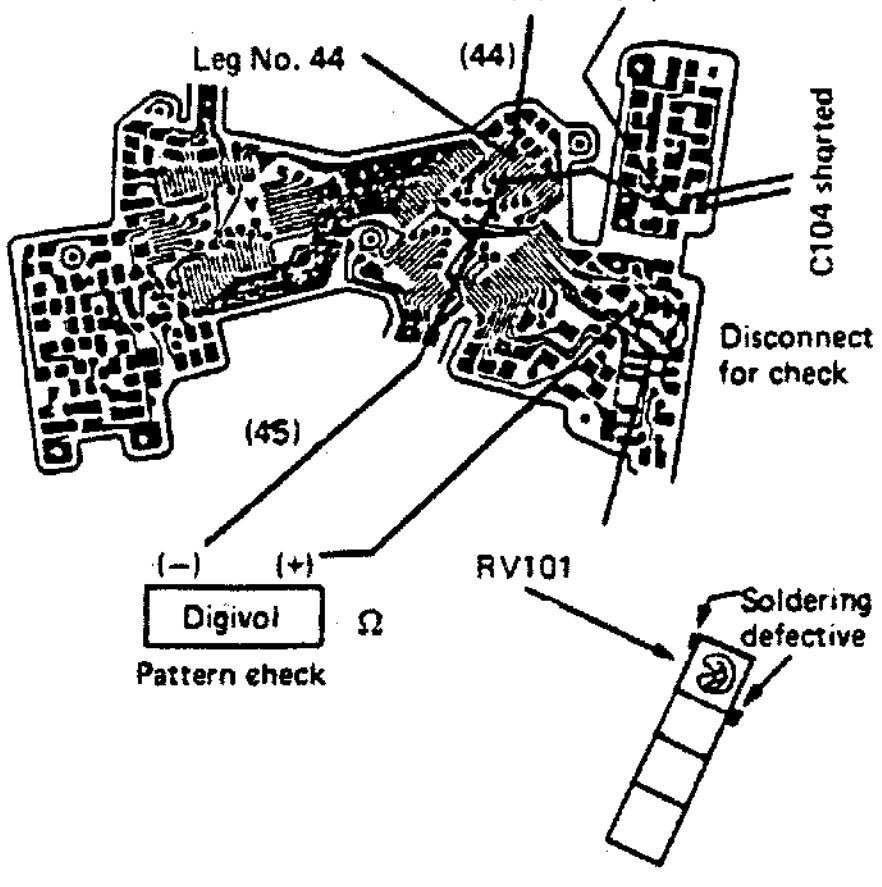


(3) Shutter left open in MANUAL mode only

- When indication is abnormal, correct it first. Refer to "LCD Indication Abnormal".

- When indication is normal
  1. C104 shorted
     When shutter is closed after disconnecting C104, it is defective
  2. Pattern broken
  3. B.P. leg No. 44 improperly soldered
  4. RV101 broken or improperly soldered
  5. B.P. leg No. 45 improperly soldered

Pattern check



3-5 Shutter Speed Too High

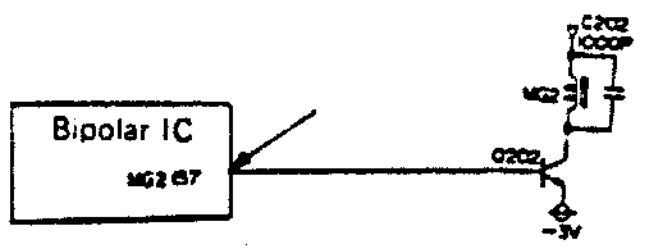
- Check indication whether or not it is normal.
- When indication is abnormal, correct it referring to "LCD Indication Abnormal".
- Therefore, check on a premise that indication is normal.

- Preparations
  1. Measuring instruments: : Digital voltmeter or circuit tester
     : Synchroscope (storage)
  2. Mode: : AUTO or MANUAL
  3. Replace shutter for checks.

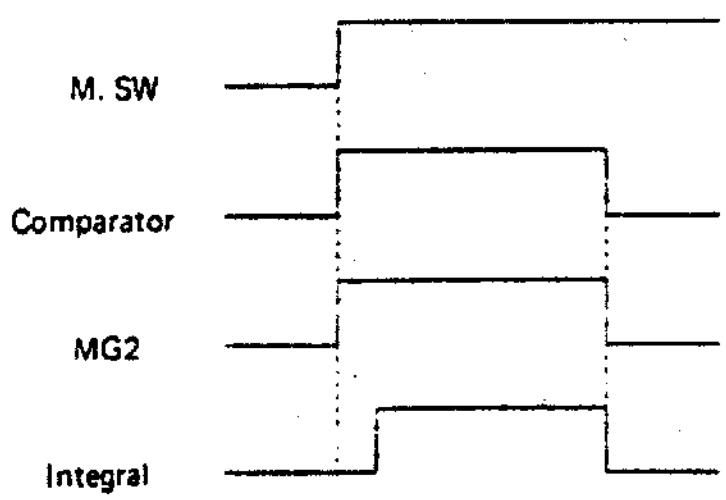
(1) Shutter speed too high in both AUTO and MANUAL modes

1. MG2 signal observable?

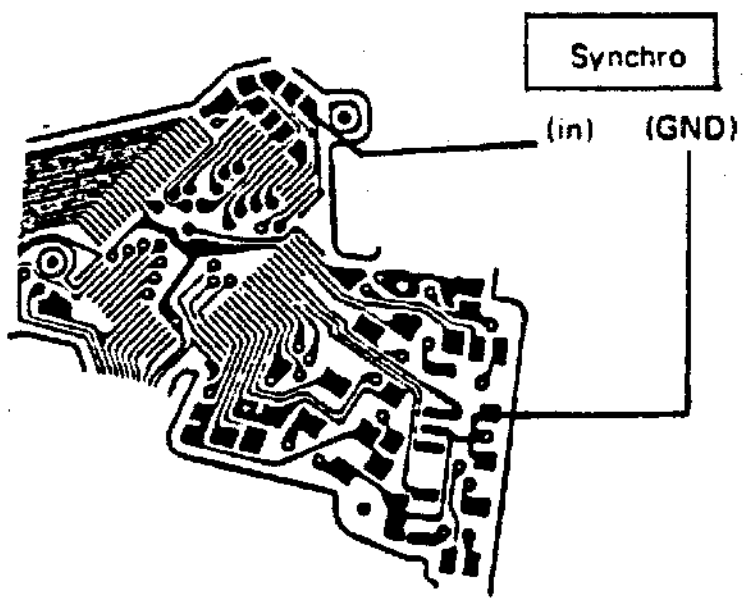
- Check with a synchroscope.



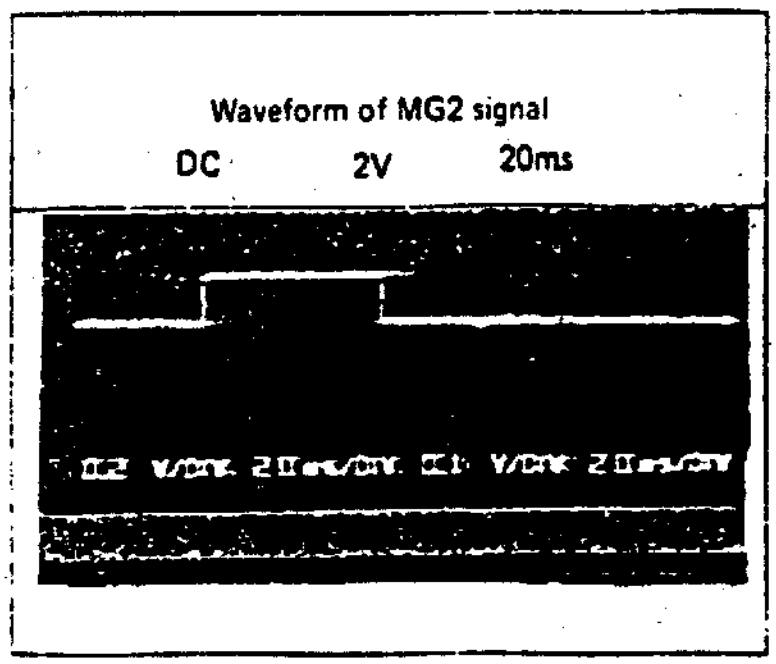
Time chart



Waveform of MG2 signal



- If a synchroscope is not available, disconnect (H) lead wire. With (H) lead wire shorted to camera body, release shutter.
  When shutter speed is still too high, MG2 or related part is defective. (See the next page)

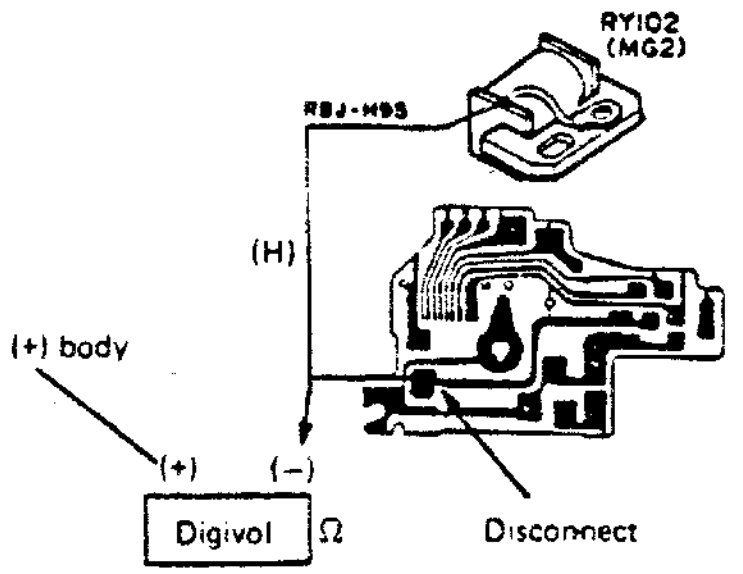


A. When normal waveform is observed

- MG2 or related part defective

(1) MG2 or (H) lead wire broken
- Disconnect (H) lead wire.
- Detach cover.
- Check continuity.
  Resistance should normally be 600Ω.

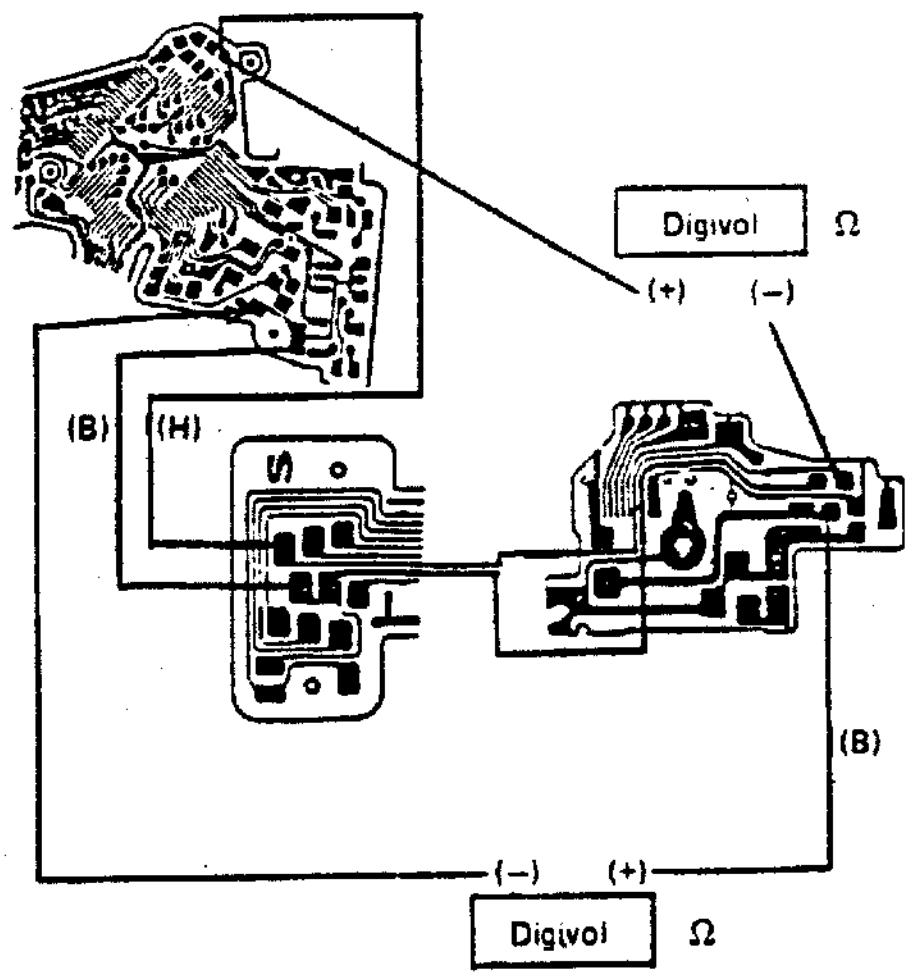
Check of MG2



(2) Check (H) lead wire and pattern
- Check continuity.

Check (B) lead wire and pattern.
- Check continuity.

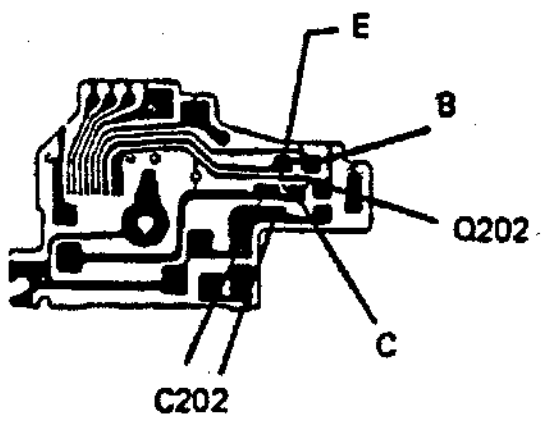
Check of pattern and lead wire



(3) Q202 broken or defective
- Release shutter with emitter and collector of Q202 shorted to each other. When shutter is kept open, Q202 is defective.
- For strict confirmation, disconnect and check Q202.

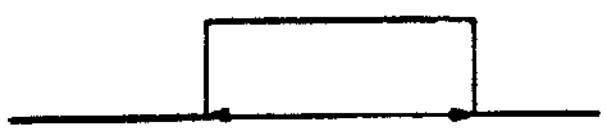
(4) C202 shorted or defective
- Release shutter with C202 disconnected.
- When shutter is kept open, C202 is shorted.

Check of Q202 and C202



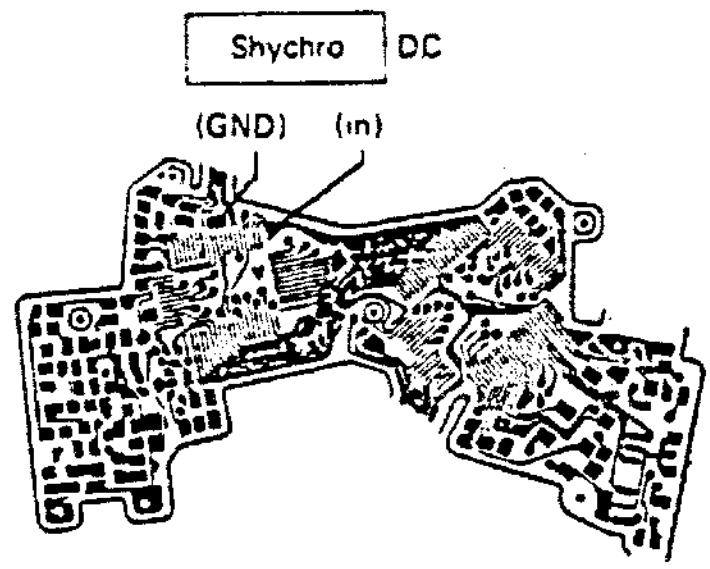
B. When normal waveform is not observed

- Check whether or not trigger data signal is provided.
  - Release shutter at a low speed in MANUAL (or AUTO) mode.
  - Normal waveform at 1/8 in MANUAL mode.



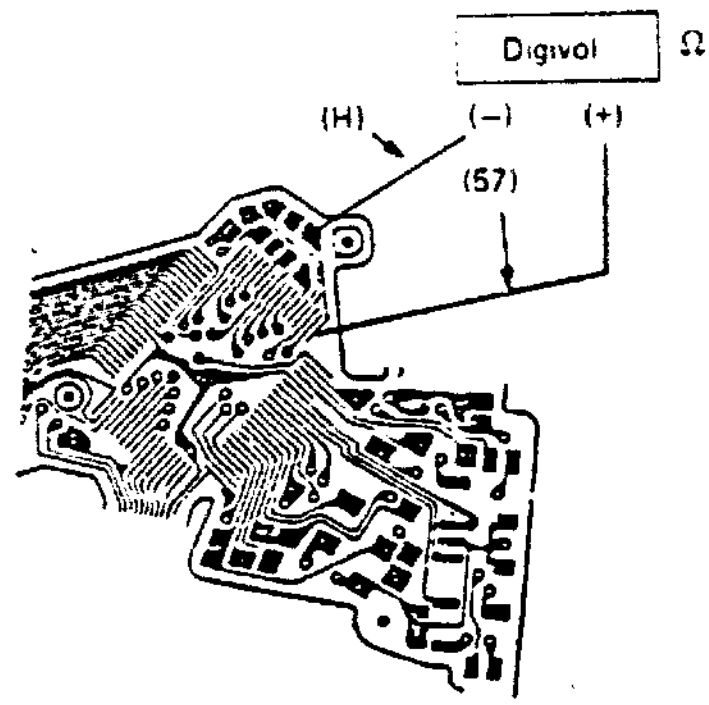
Approx. 117mS

Check of trigger data waveform



(1) When normal waveform of trigger data is observed.
  (a) B.P. leg No. 57 improperly soldered.
  (b) Pattern broken
  (c) B.P. IC defective

Check in (1)

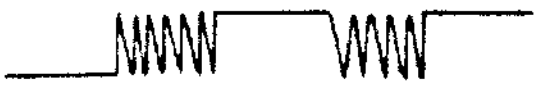


(2) When waveform of trigger data is n
ed
  - MG2 and related circuit OK
  - Shutter mechanism or B.P. defect

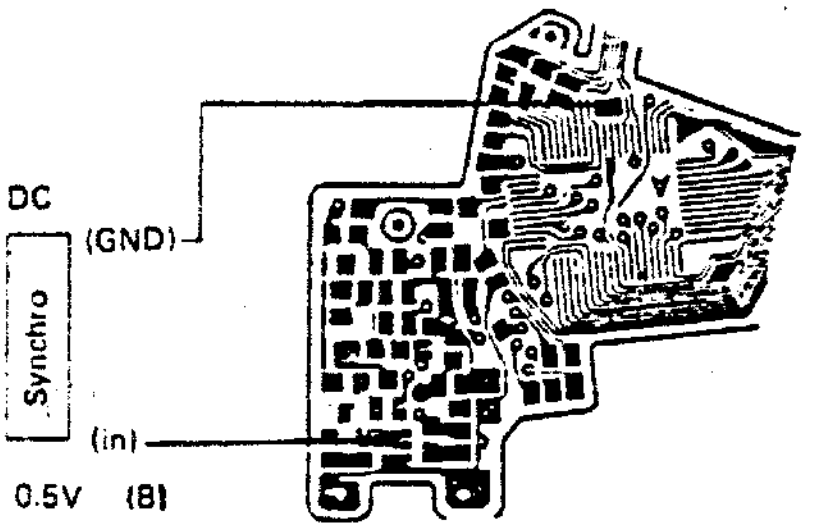
2. M SW chattering

- Check with a synchroscope.
- Normal waveform

- Chattering



Check of M SW chattering

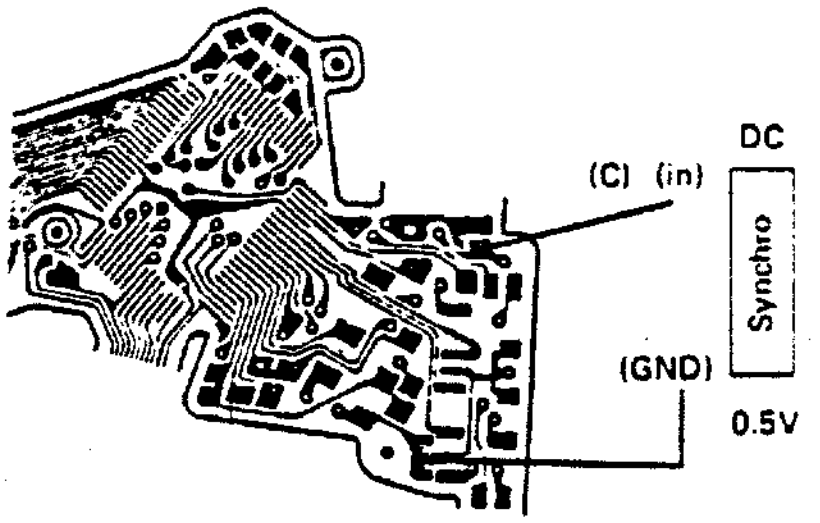


3. Trg SW chattering

- Check with a synchroscope.
- Normal waveform

- Chattering

Check of Trg SW chattering



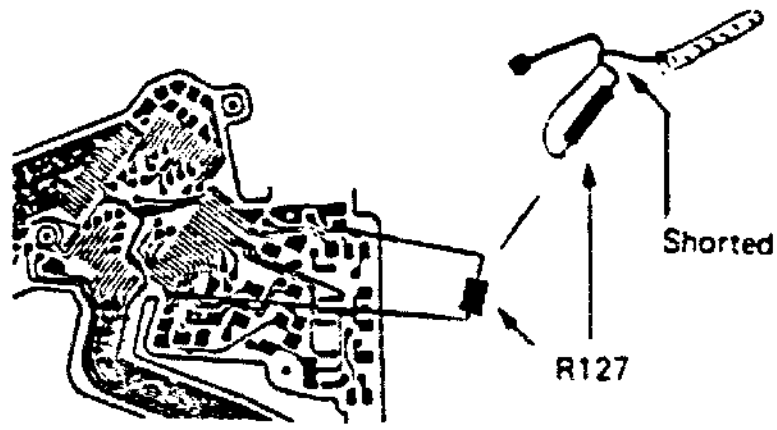
(2) Shutter speed too high in AUTO mode only

- Head amplifier or related circuit defective
- ASA resistor, direct EE circuit or related part defective

1. Head amplifier or related circuit defective

(1) R127 shorted

R127 shorted

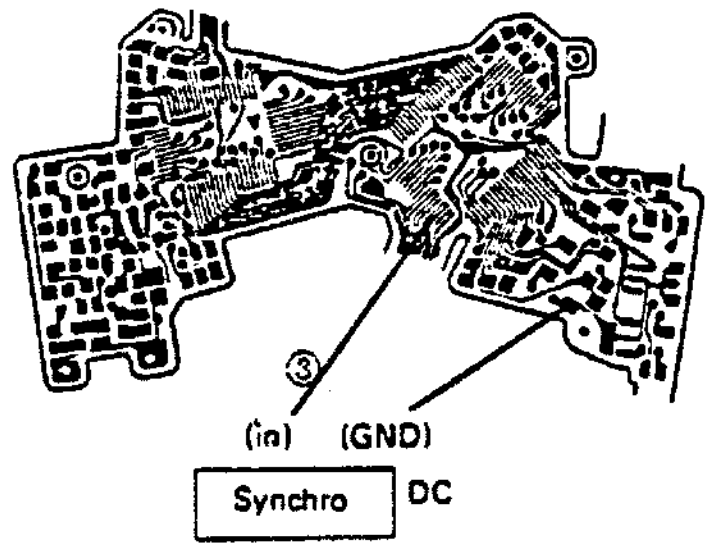


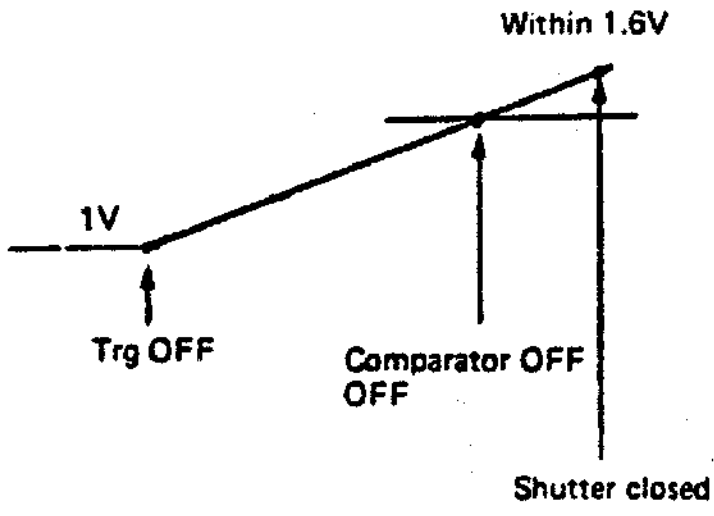
(2) Integral output too high

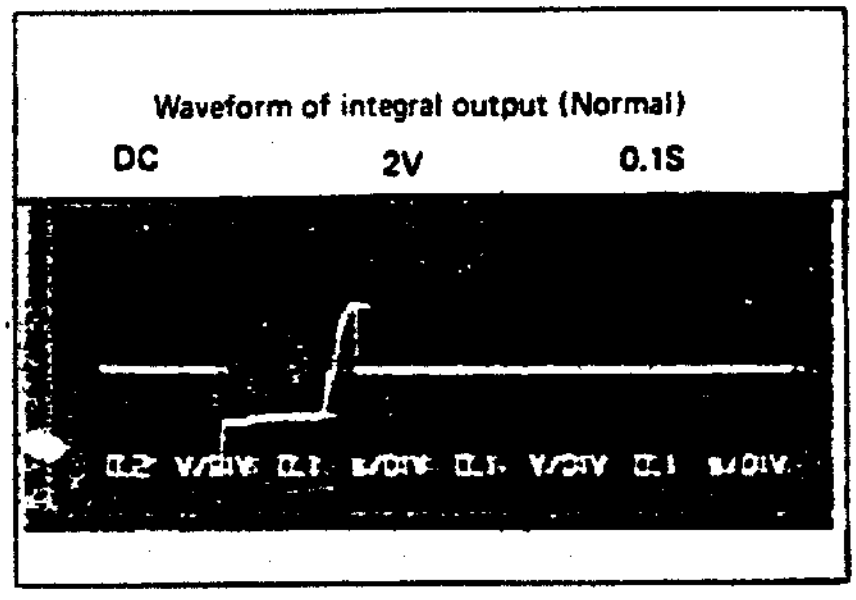
- See 3-2-(9) "Head amplifier or related part defective".
- Check with a synchroscope.
- Release shutter at a low speed in AUTO mode. Voltage should be lower than 1.6 V while shutter is closed.

- Normal waveform

Check of integral output

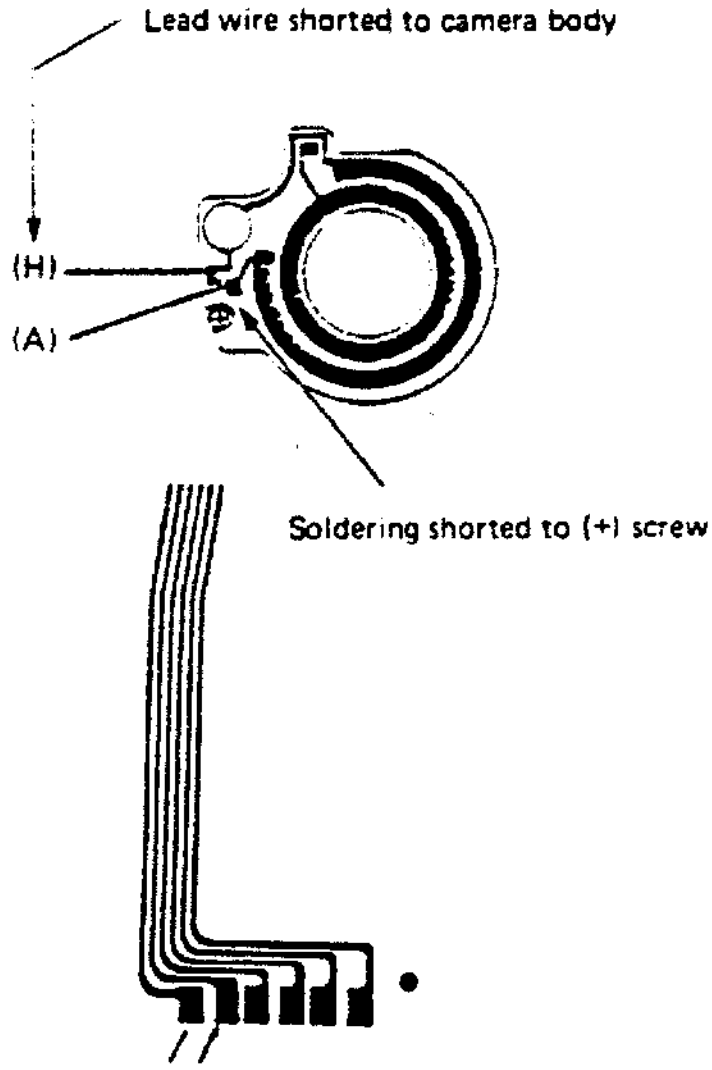






2. ASA resistor, EE adj. circuit or related part defective

(1) ASA resistor lead wire shorted to camera body
- (H) and (A) lead wire shorted



(2) RV110 (EE adj.) shorted to camera body

RV110 shorted to camera body

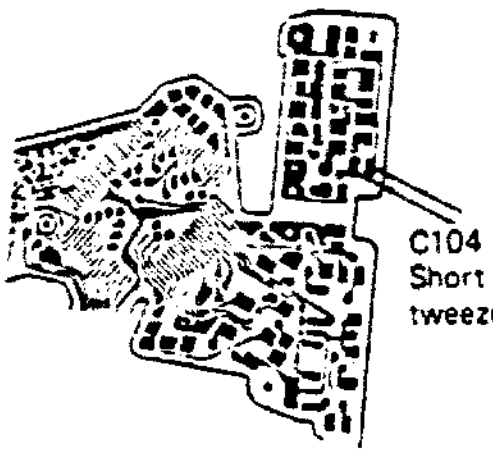
3. Others

- IC defective
- Mechanism defective

(3) Shutter speed too high in MANUAL mode only

- When indication is normal but shutter operation is abnormal in MANUAL mode only, regeneration capacitor or related part is defective. Otherwise, IC is defective.

- When TV input is abnormal, indication becomes also abnormal.
  In such a case, correct indication first.
- C104 broken or defective
  Short both ends of C104 with tweezers.
  If shutter is kept open, C104 is defective.



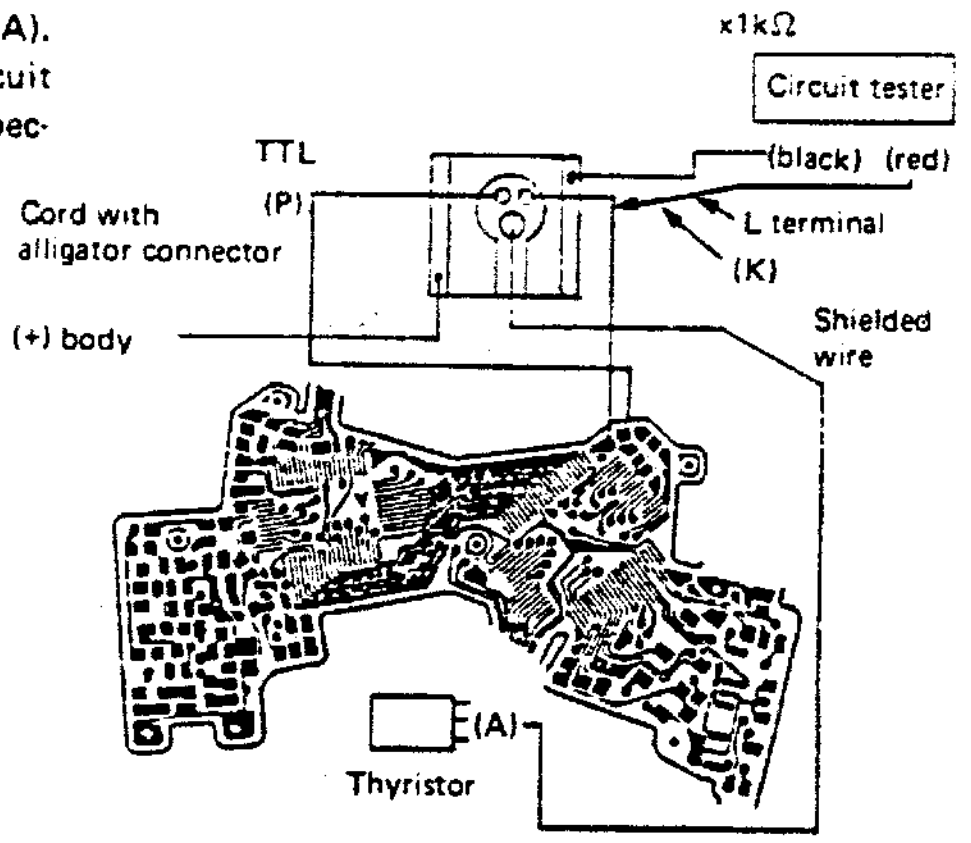
3-6 Flash Circuit Defective

- Preparations
  1. Measuring instruments: : Digital voltmeter or circuit tester
     : Synchroscope (storage)
  2. Mode: : AUTO
  3. Others: : Detach top cover.
     : Do not remove L terminal (K), TTL (P) and X (shielded wire) for flash. Lead wires may be extended for convenience of checks.
     : Connect top cover to camera body with alligator connector.
     : Attach flash (T20 or 32) in position.

1. Flash mode unswitchable

- Check procedures
  1. Set a circuit tester at x1 kΩ range (0.06mA).
  2. Connect black and red rods of the circuit tester to camera body and L terminal respectively.
  3. OK when LCD indicates FLASH mode. (▶ 60 ◀)
- Set camera in AUTO mode.

Check of flash

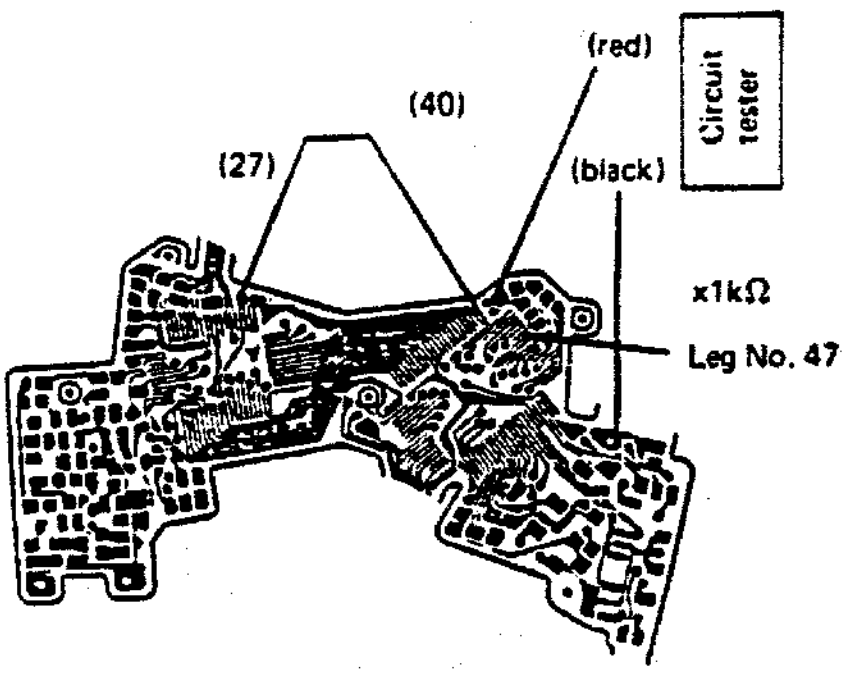


(1) Camera cannot be set in FLASH mode with shoe.

- Check in the procedures similar to those described above with red rod of circuit tester connected to L terminal.

  (a) Camera cannot be set in FLASH mode with M circuit board.
  1. Pattern broken
  2. B.P. leg No. 47 improperly soldered.
  3. B.P. leg No. 40 improperly soldered.
  4. CPU leg No. 27 improperly soldered.

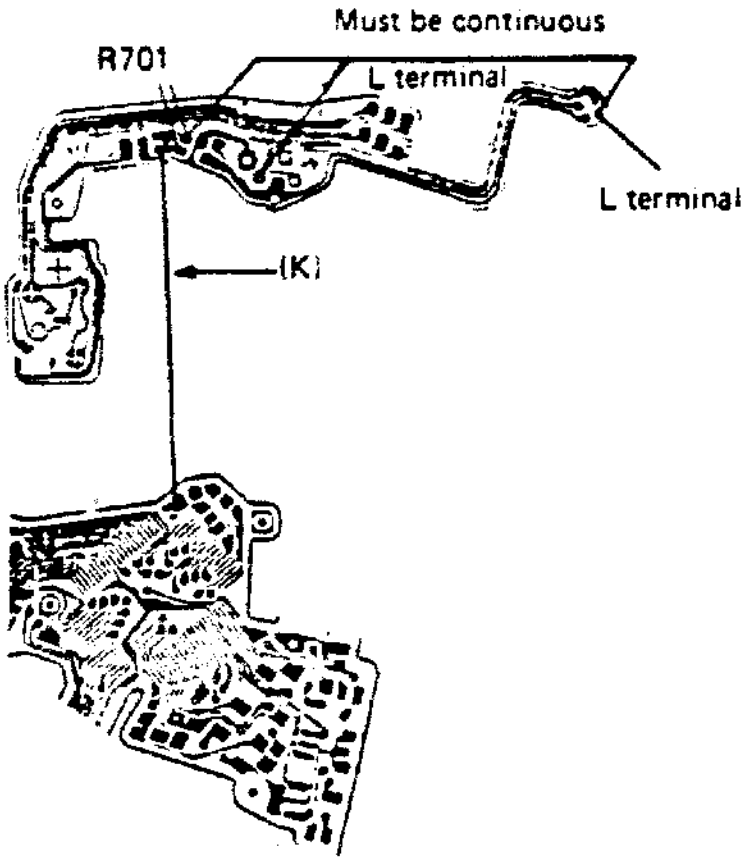
Check of flash



(b) Camera can be set in FLASH mode with M circuit board

- Top cover or related part defective
  1. L terminal lead wire (K) broken.
  2. U circuit board defective
  3. R701 broken

Check of L circuit board

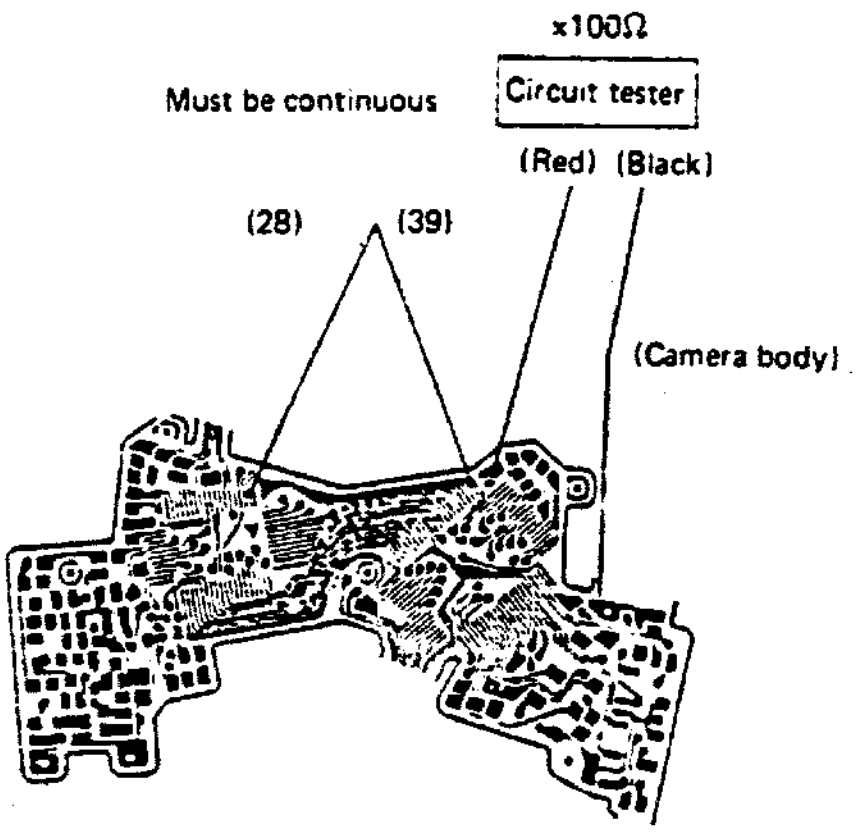


2. Charge completion LED not light

- Check procedures
  1. Set circuit tester at x100Ω range (0.6 mA).
  2. Connect black and red tester rods to camera body and L terminal respectively.
  3. OK when LED lights.
  - Premise: Camera is set in FLASH mode at the preceding step.

- When LED not light
  1. Pattern broken between B.P. leg No. 39 and CPU leg No. 28.
  2. B.P. leg No. 39 improperly soldered.
  3. CPU leg No. 28 improperly soldered.
  4. Flash LED circuit defective.
     See "LED indication abnormal" on page E-197.

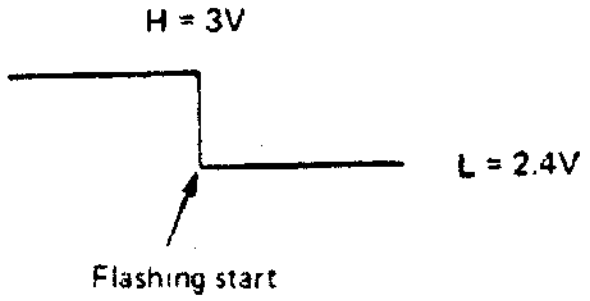
Check of charge completion LED



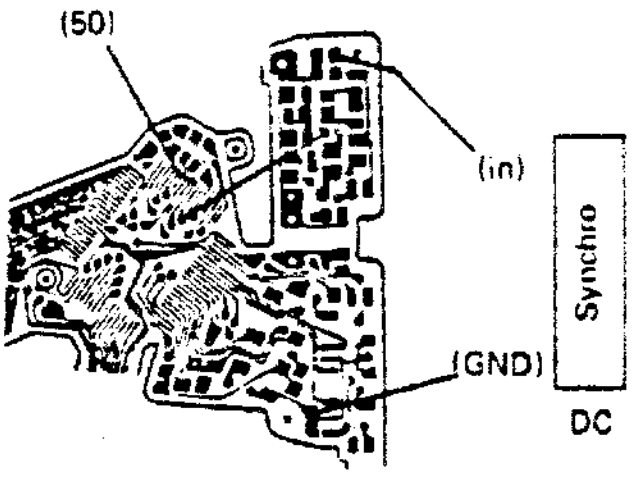
3. Strobe not flash

- Check procedures
  1. Observe waveform on a synchroscope
  2. Check waveform on B.P. leg No. 50 (or Q101B). Release shutter with flash attached in position (power SW ON) and check waveform.

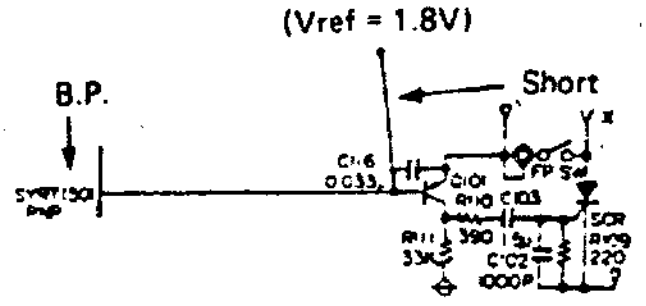
Normal waveform

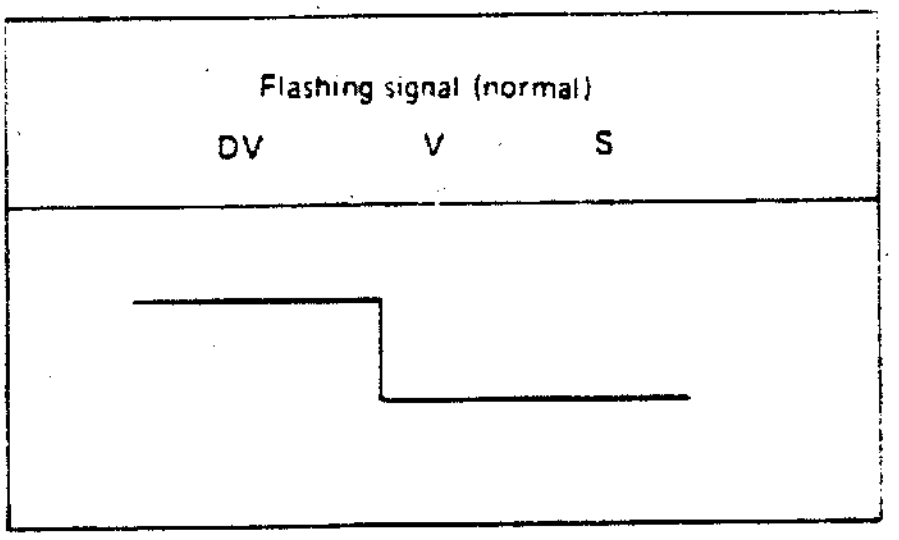


Check flashing



  3. If a synchroscope is not available, short Q101B to terminal of Vref = 1.8 V. When strobe flashes, external flash circuit is OK.

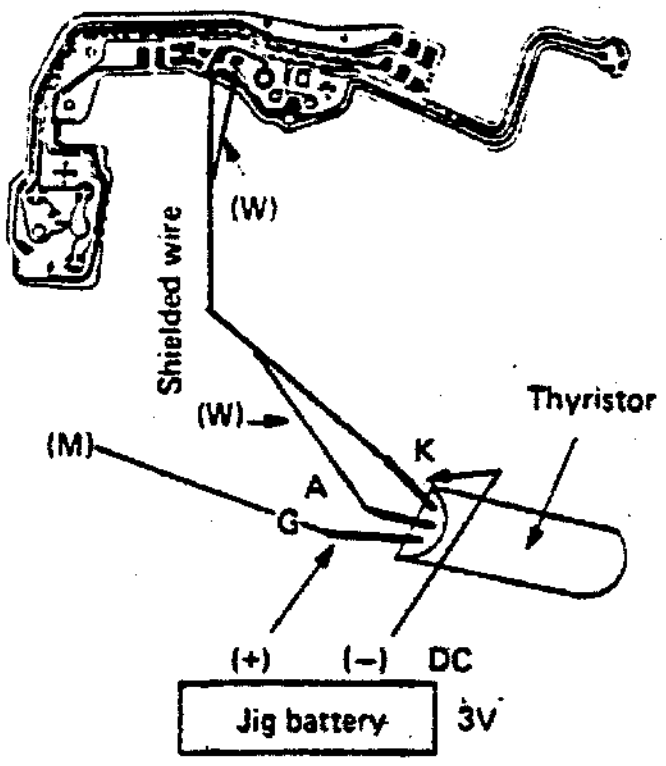




(1) Strobe not flash with normal waveform
- External flash circuit defective

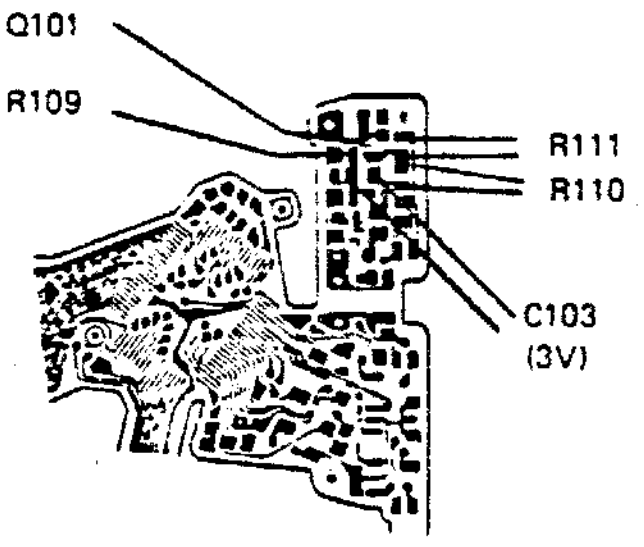
  1. Shielded wire broken
     Check with a circuit tester.

  2. Thyristor broken
     Connect (–) and (+) terminals of a dummy battery (3 V) to (K) and (G) respectively of thyristor.
     Thyristor is OK when strobe flashes.
     Thyristor is defective when strobe does not flash.



3. Voltage applied to C103?
   Should normally be approx. 3 V.
   - When voltage is not applied
     R109, R110 or R111 lead wire broken.
     Check C103.
   - Disconnect and check Q101 for shorting.

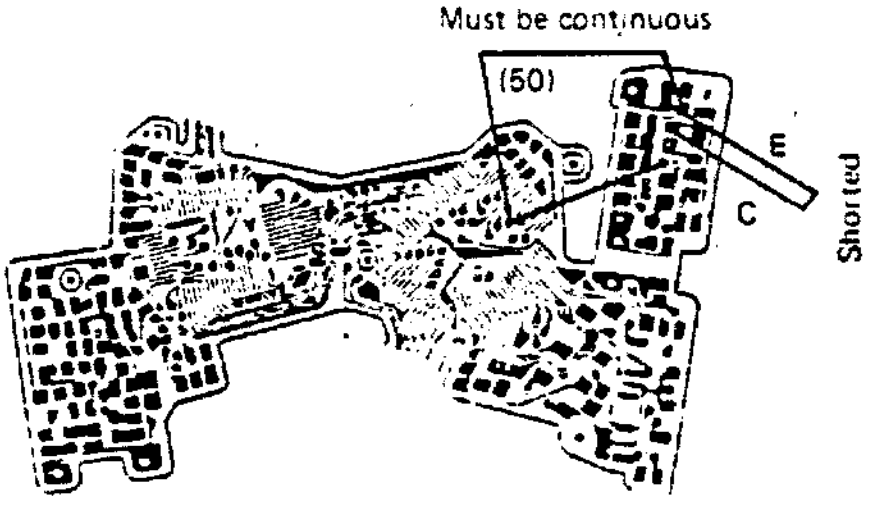
When no voltage is applied to C103



4. Pattern broken
   Check for breakage between B.P. leg No. 50 and Q101B.

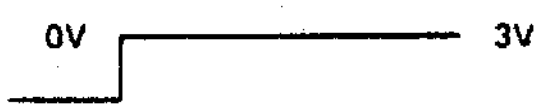
5. B.P. leg No. 50 improperly soldered.

6. Short emitter and collector of Q101 with tweezers.
   Q101 is defective when strobe flashes.

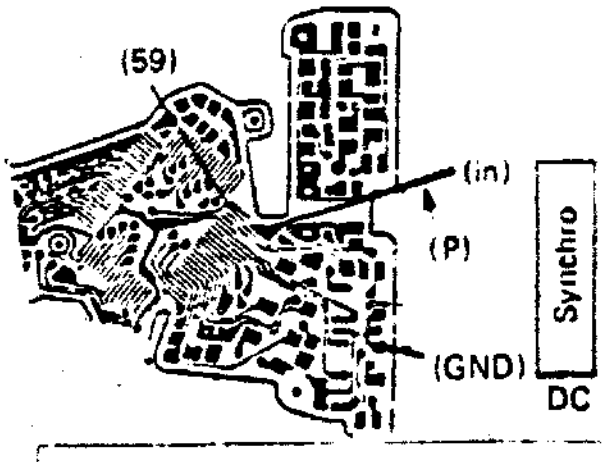


(2) Normal waveform not observed on B.P. leg No. 50 or Q101B.
   1. Check voltage waveform on soldering of pattern for X contact lead wire (with a synchroscope).

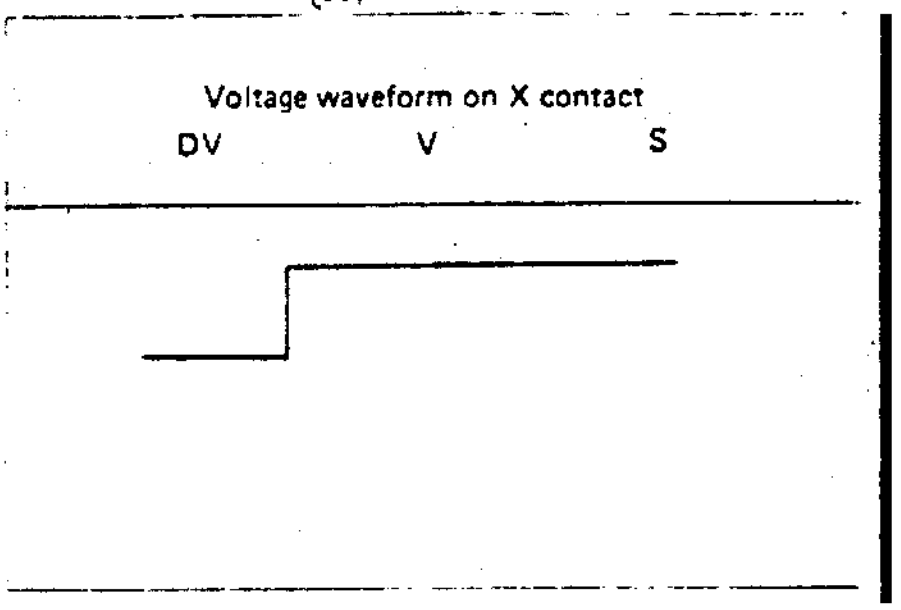
Normal waveform



2. When normal waveform is observed
   - B.P. leg No. 59 improperly soldered.
   - Pattern broken



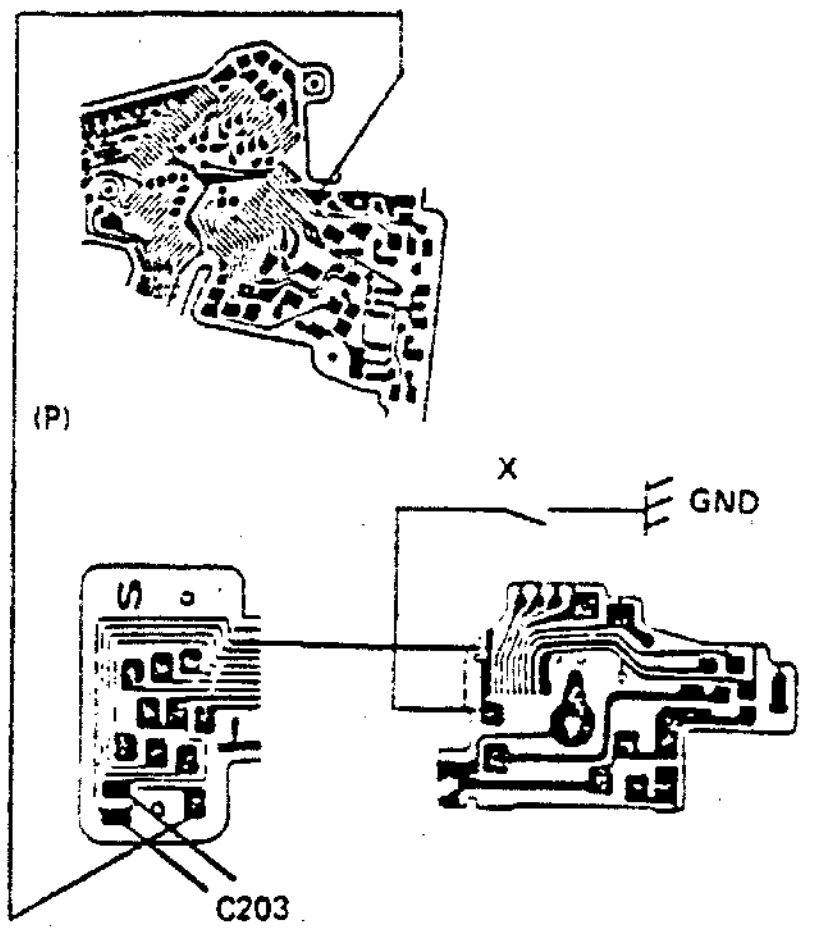
Voltage waveform on X contact



3. When normal waveform is not observed
   - (P) lead wire broken
   - Pattern broken
   - C203 shorted or broken
   - X SW contact defective

(3) When input waveform is normal on B.P. leg No. 59 but no waveform is observed on leg No. 50, B.P. IC is defective.

Check in (3)



4. Light control impossible (TTL central control ineffective)

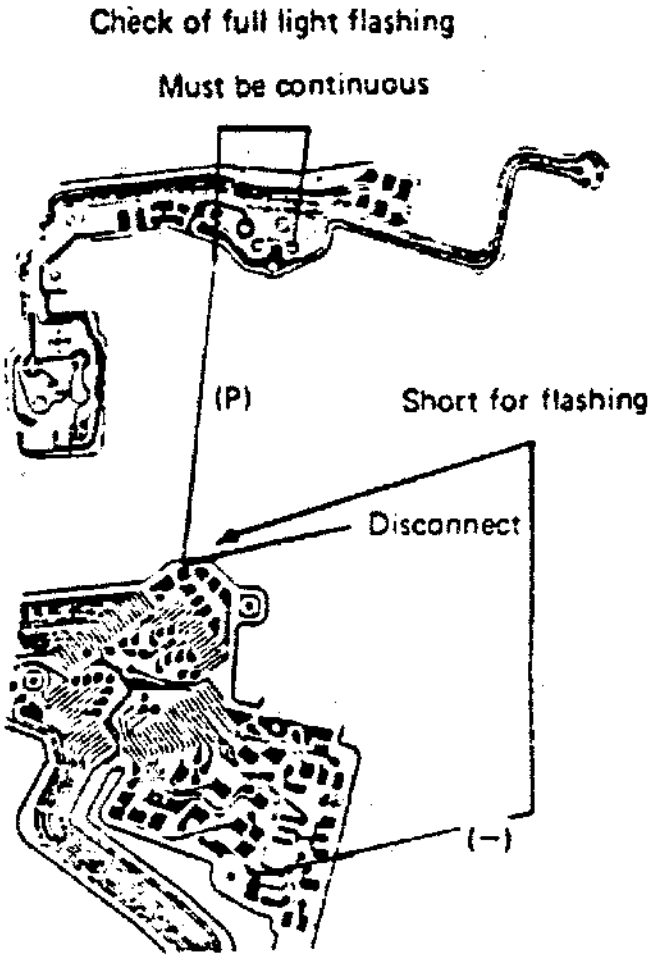
- Flash operates normally.
- Camera must be set in FLASH mode.
- Strobe flashes normally.
- When light control does not operate in the conditions mentioned above

(1) Flash gives full light

- Check procedure
  Disconnect TTL lead wire (P) and short it to (−) power supply.

(a) When flash gives full light

1. U circuit board defective
2. (P) lead wire broken

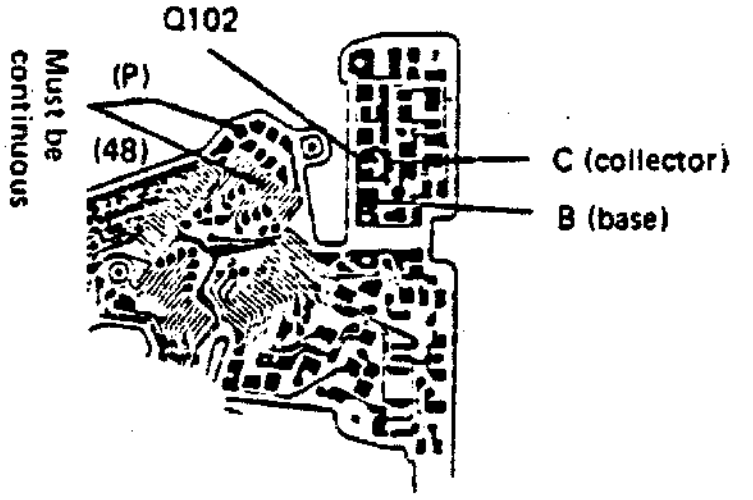


(b) When flash gives low light

1. Q102 shorted or broken
   - Short base and emitter of Q102 for flashing.
   - ○ Q102 is defective when strobe flashes normally.
   - ○ Q102 is OK when strobe gives full light.

2. Wire breakage between B.P. leg No. 48 and land for (P) lead wire.

3. B.P. leg No. 48 or 49 improperly soldered.

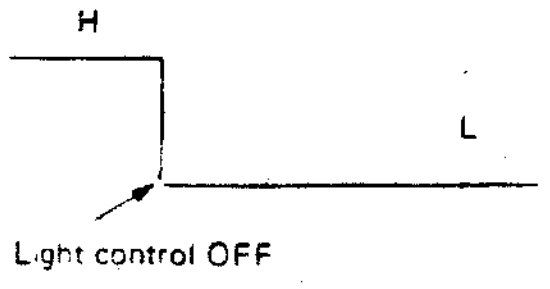


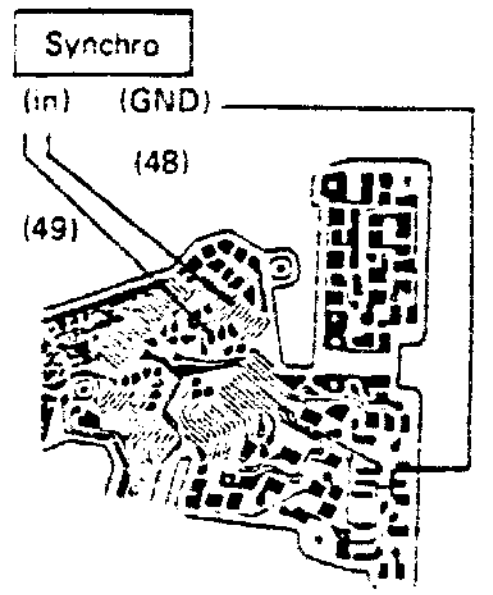
(c) Check waveforms on B.P. legs No. 48 and No. 49.

Check of outputs on legs No. 48 and No. 49

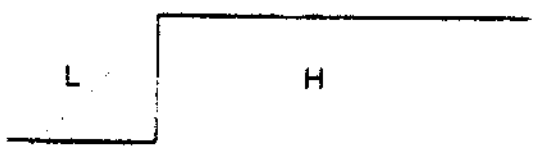
Normal waveforms

1. Leg No. 48



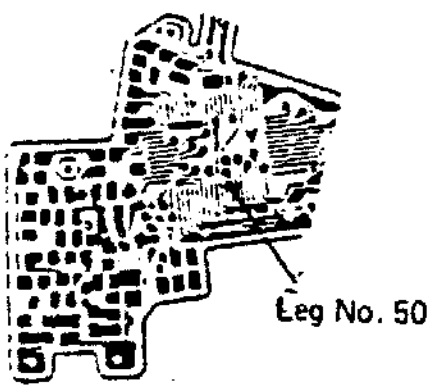


2. Leg No. 49



3. When normal waveform is not observed

CPU leg No. 50 improperly soldered.
B.P. IC defective



(2) Flash gives low light

- IC defective

3-7 EE Adjustment Abnormal

1. Main comparator offset misadjusted

- EE abnormal at high luminance
- No stability of EE
- Check procedures
  (1) Set shutter speed at 1 sec in MANUAL mode.
  (2) Connect a stabilizer power supply to positive (+) side of C104.
  (3) Connect negative side of the stabilizer to negative land of C114.
  (4) Set the stabilizer at 1 V.
  (5) Release shutter.
  (6) Adjust RV103 so that shutter is closed within 1 sec.
  (7) For this adjustment turn RV103 counterclockwise. After releasing shutter, turn RV103 clockwise and stop it when shutter is closed.
  (8) Make sure that shutter can be closed within 1 sec.

When shutter cannot be closed within 1 sec.

- RV103 contact floated up
  → Readjustment
- Clean RV103 with a piece of dry cloth.

2. C109, C110 or C111 leg, or B.P. No. 4, 5 or 6 improperly soldered

- When EE adjustment is abnormal at any one of three stages ASA 6 to 32, ASA 40 to 250 and ASA 320 to 3200, C109, C110, C111 or B.P. No. 4, 5 or 6 is improperly soldered.

3. Chattering of main SW

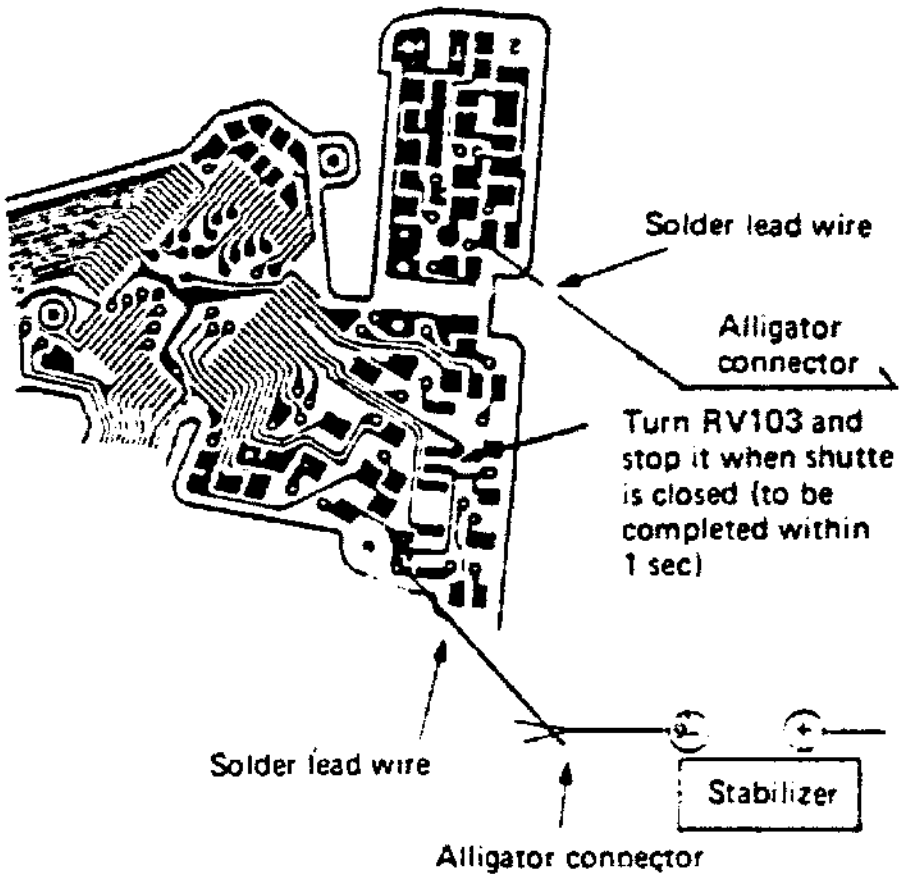
- See page E-182.

4. C112 (phase compensating capacitor) floated up.

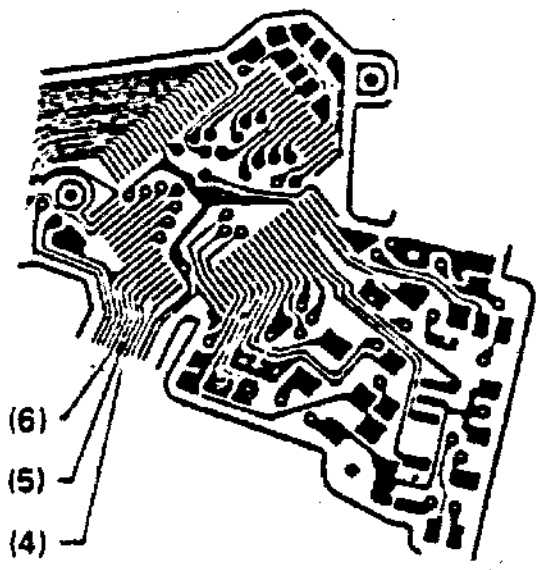
5. Head amplifier defective

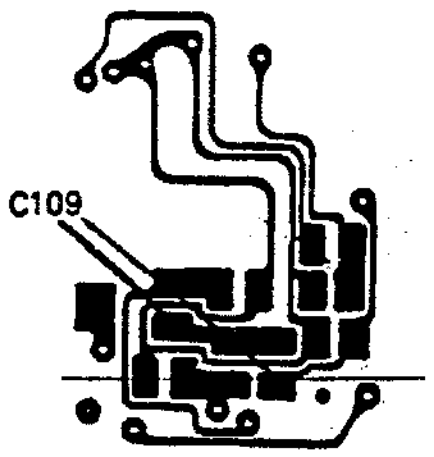
- See page E-151.

Adjustment of comparator offset


Solder lead wire
Alligator connector
Turn RV103 and stop it when shutte is closed (to be completed within 1 sec)
Solder lead wire
Stabilizer
Alligator connector

Checks in 2 and 4.





3-8 Regeneration Time Abnormal

- When indication is abnormal, correct it first referring to "LCD Indication Abnormal".

1. 1/8 sec adjustment impossible in MANUAL mode

- RV101 defective → Replace

2. 1/2000 sec adjustment impossible in MANUAL mode

- C101 improperly soldered

3. R102 or RV102 defective

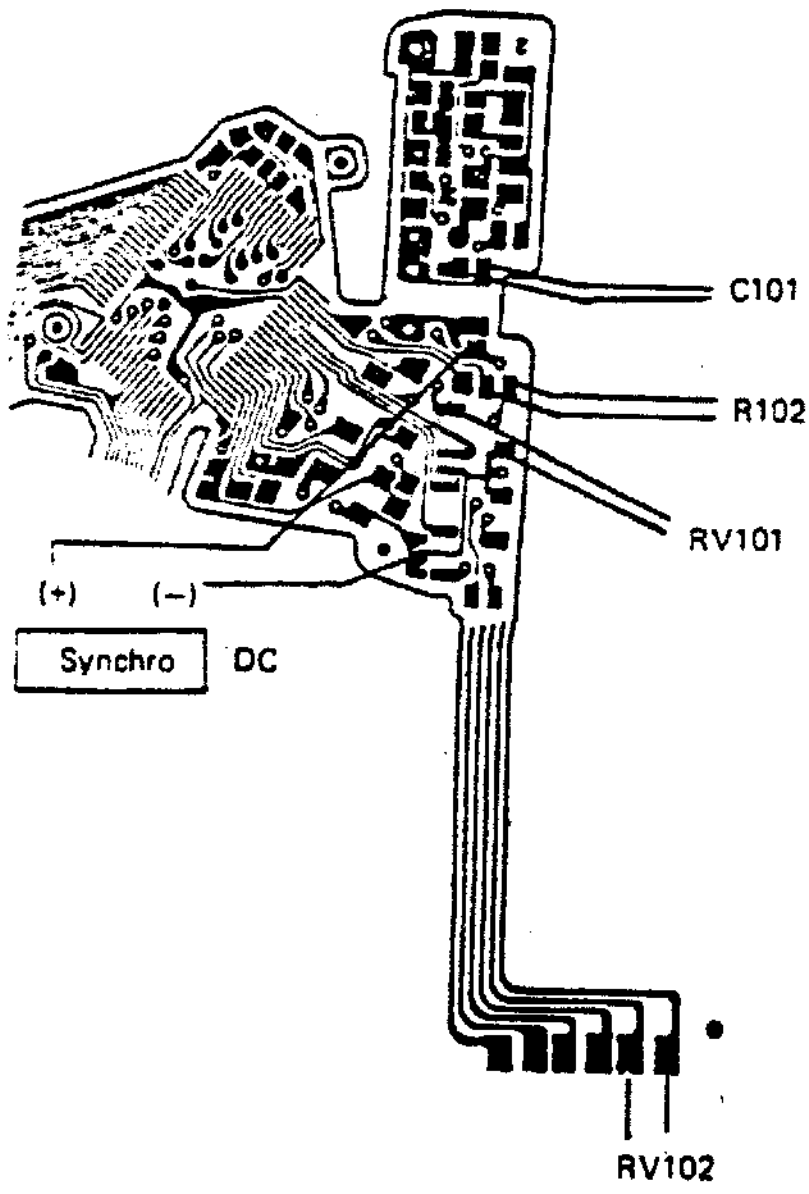
- Resistor constant wrong

4. Chattering of Trg SW

- Chattering causes instability at high speed.
- See page E-182.

5. 1/500 and 1/1000 negatively deviated

- Mechanical trouble
  - Slight positional deviation between 1st and 2nd curtains.
  - Readjust curtain positions.

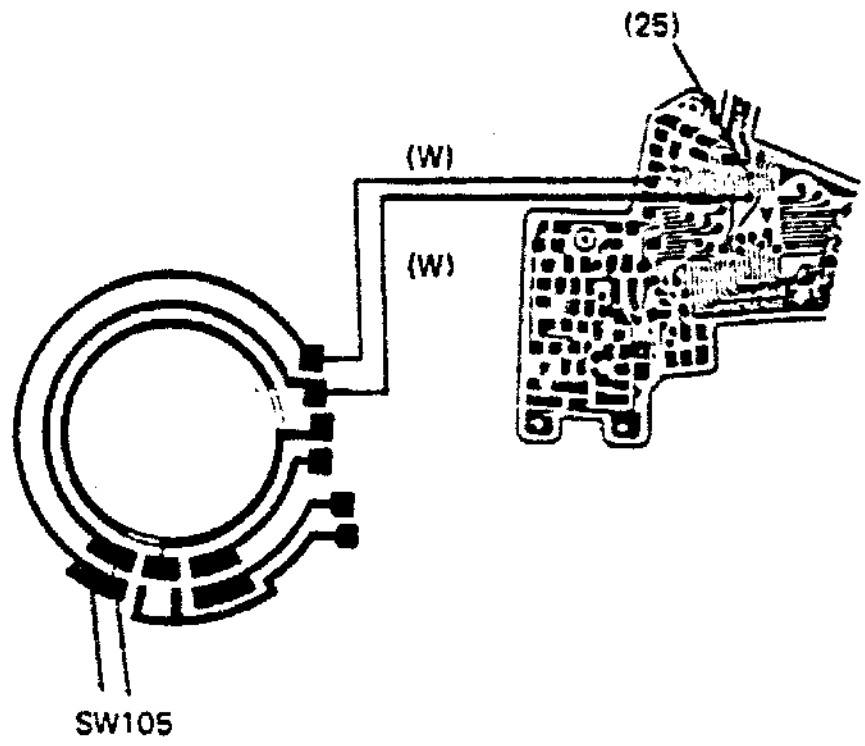


3-9 Malfunction of B.C. System

1. Camera cannot be set in B.C. mode

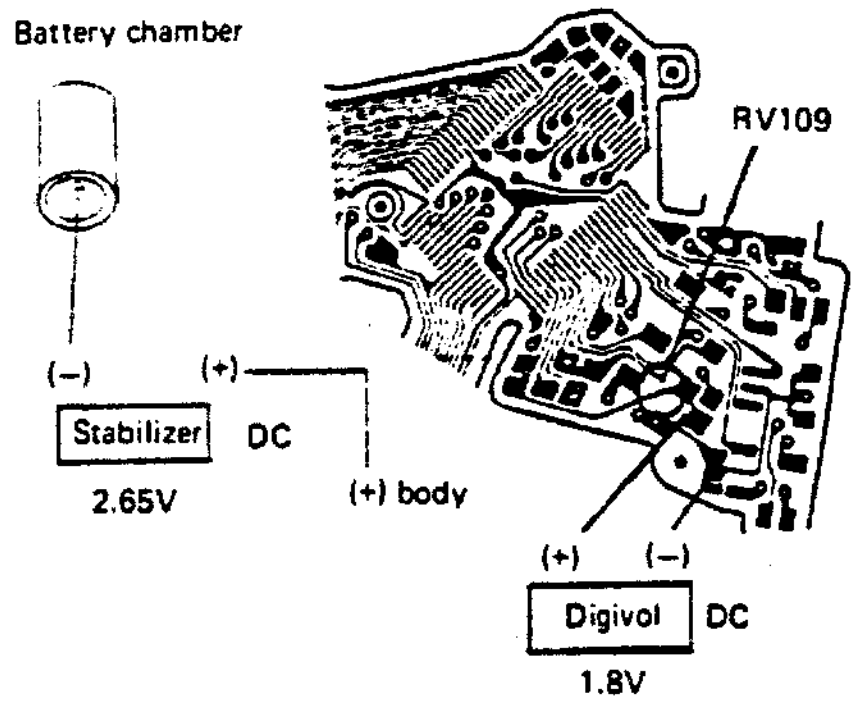
- PCV does not sound and LED does not light
  (1) (W) lead wire broken
  (2) Poor contact on SW105
  (3) CPU leg No. 25 improperly soldered.
- Check for Vref = 1.8 V
  If not, circuit misadjusted.

Malfunction of B.C. circuit



2. Adjustment of B.C. circuit

- Set stabilizer at 2.65 V and turn lock adj. RV109 as to obtain Vref = 1.8 V.
- For LED and PCV, refer to the concerned sections.
  See page E-197, 199.



3-10 . Malfunction of Self-Timer

- Check whether or not LCD indication is normal within viewfinder. Correct indication first if it is abnormal.
- For LED and PCV, refer to the concerned sections.

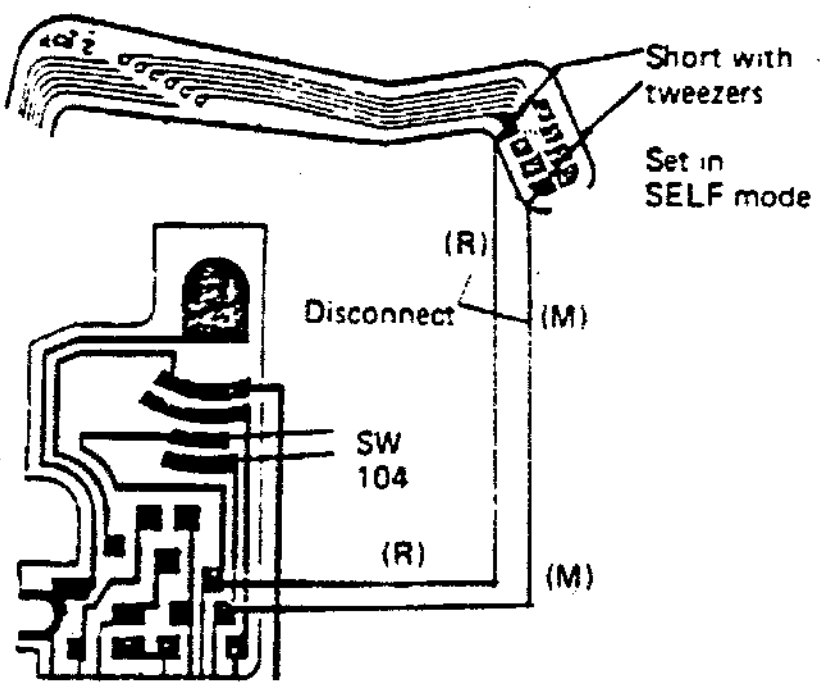
- Disconnect SELF mode lead wire and set camera in the mode by shorting its land with tweezers.

1. **When camera is operative after setting it in SELF mode by shorting with tweezers**

   - CE circuit board or related part defective

     (1) (R) or (M) lead wire broken
     (2) SW104 defective

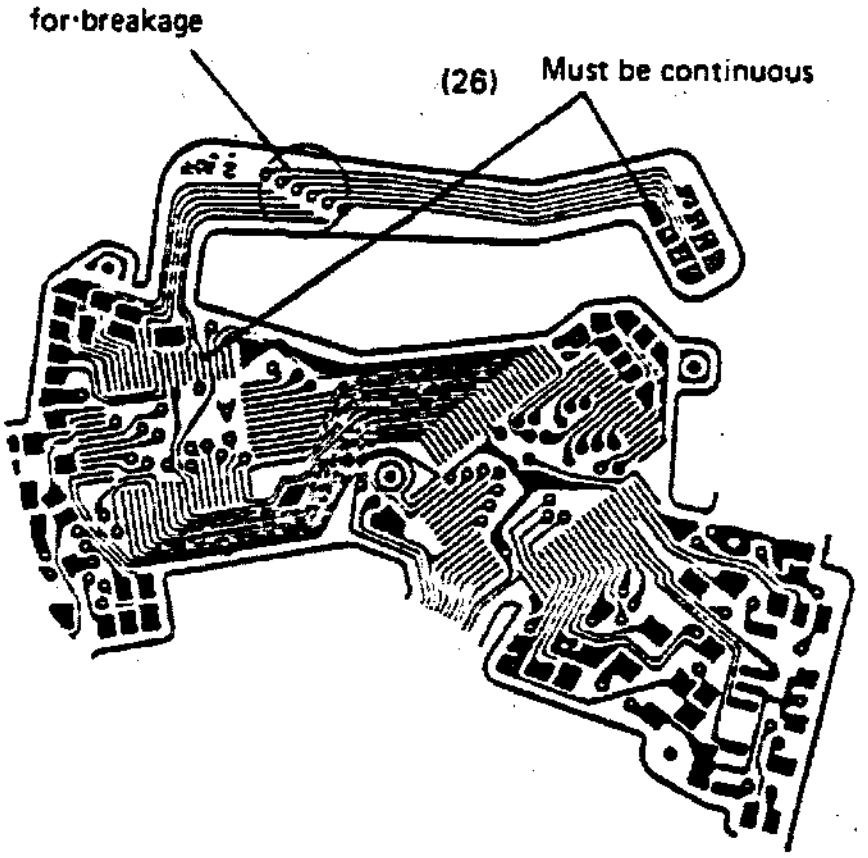
Check of CE circuit board



2. **When camera is inoperative after setting it in SELF mode by shorting with tweezers**

   (1) Pattern broken
   (2) CPU leg No. 26 improperly soldered
   (3) CPU IC defective

Pattern broken



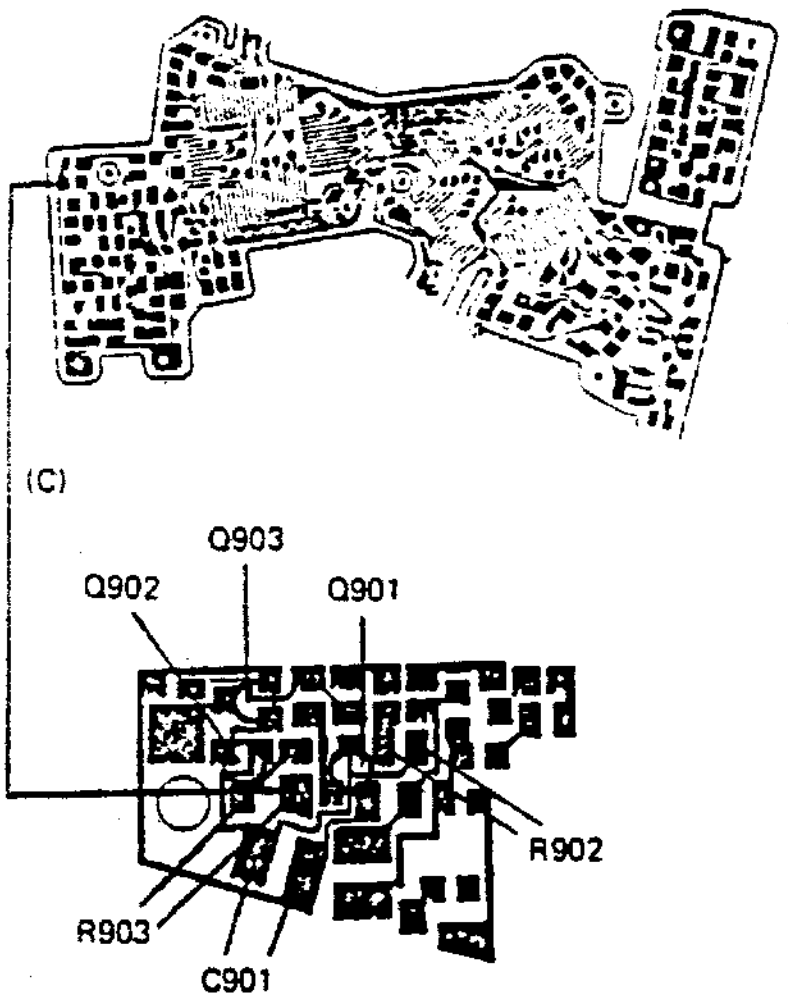
3-11 LED not Light

- Check whether or not LCD indication is normal. When LCD indication is abnormal, correct it first.

1. All LEDs not light

- Reset circuit defective
  - (1) C901 shorted or broken
  - (2) Q902 or Q903 broken
  - (3) Q901 shorted or broken
  - (4) R902 or R903 broken
  - (5) (C) lead wire broken
  - (6) Pattern broken
  - (7) B.P. leg No. 42 improperly soldered

Check in 1



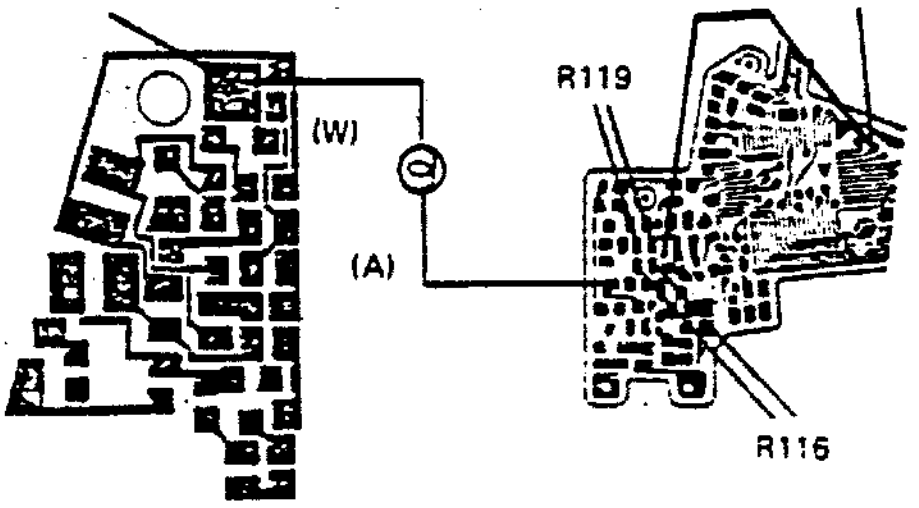
2. LAMP and FLASH LEDs not light

- (W) lead wire broken or improperly soldered

3. LAMP LED only not light

- (1) Lamp defective
- (2) (A) lead wire broken
- (3) Q105 broken
- (4) R119 or R116 broken
- (5) Pattern broken
- (6) CPU leg No. 32 improperly soldered

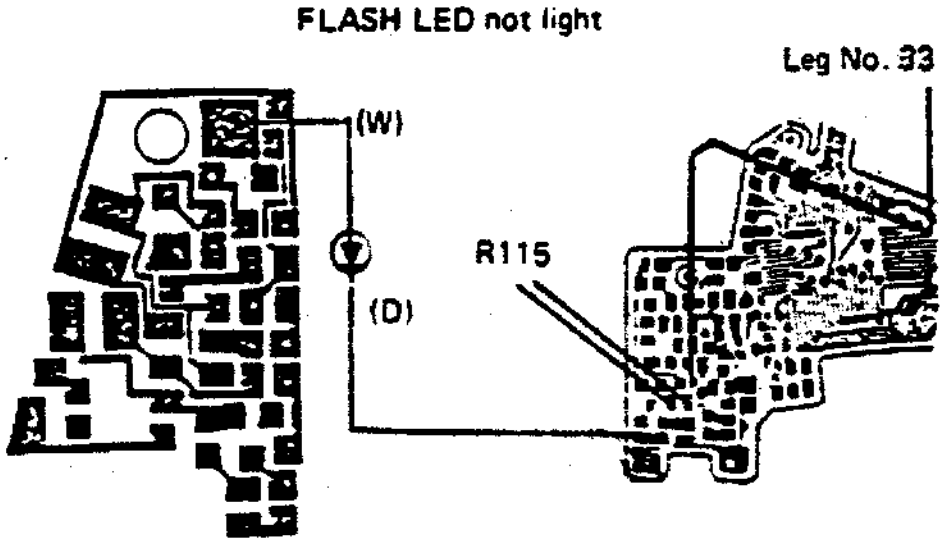
Lamp not light



4. FLASH LED only not light

- (1) LED defective
- (2) (D) lead wire broken or improperly soldered
- (3) Q106 broken
- (4) Pattern broken
- (5) R115 broken
- (6) CPU leg No. 33 improperly soldered

FLASH LED not light

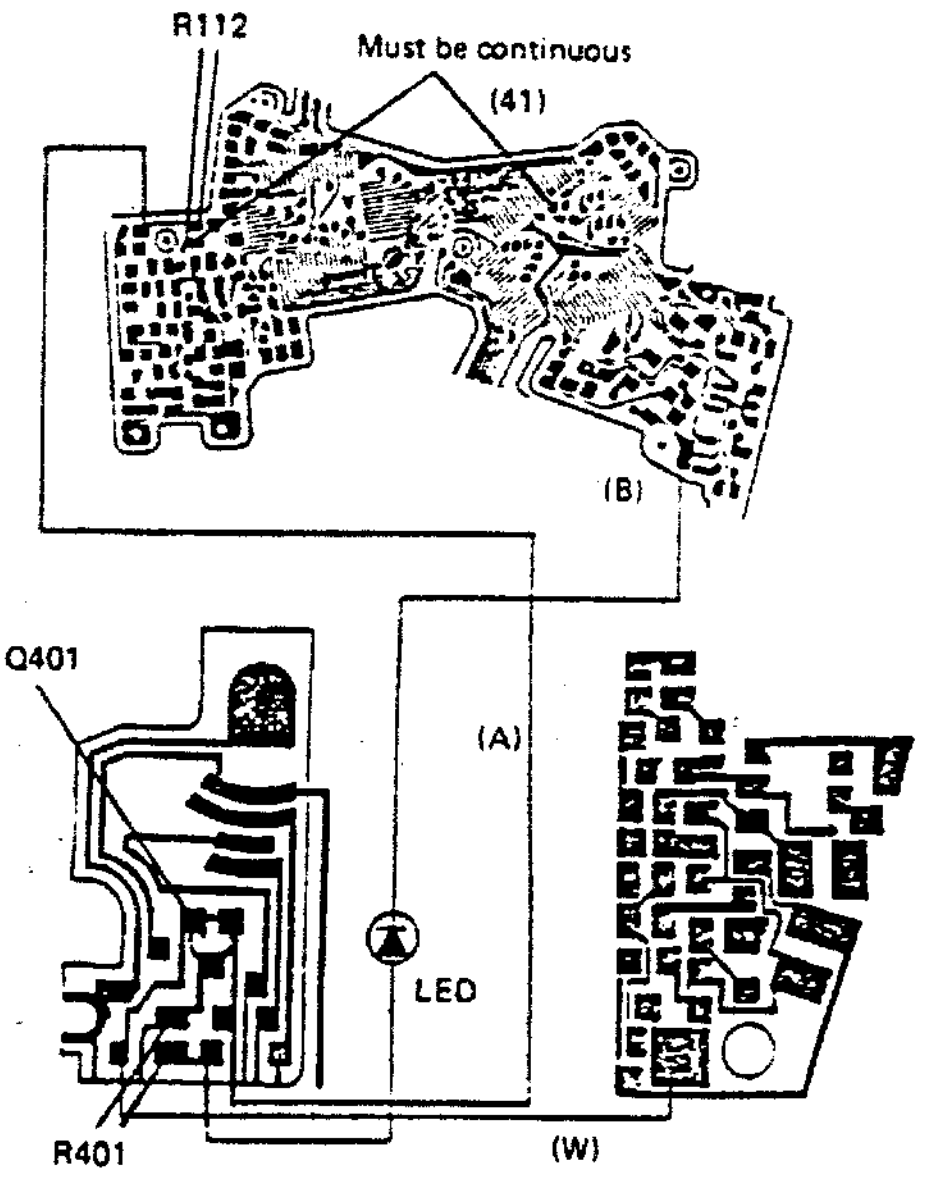


5. BC and SELF LED not light

(1) (W) lead wire broken or improperly soldered
(2) (A) lead wire broken or improperly soldered
(3) R112 or R401 broken
(4) Q401 broken
(5) (B) lead wire broken or improperly soldered
(6) B.P. leg No. 41 improperly soldered
(7) LED defective

- When PCV sounds normally and LED does not light in B.C. or SELF mode only, CPU or B.P. is defective.

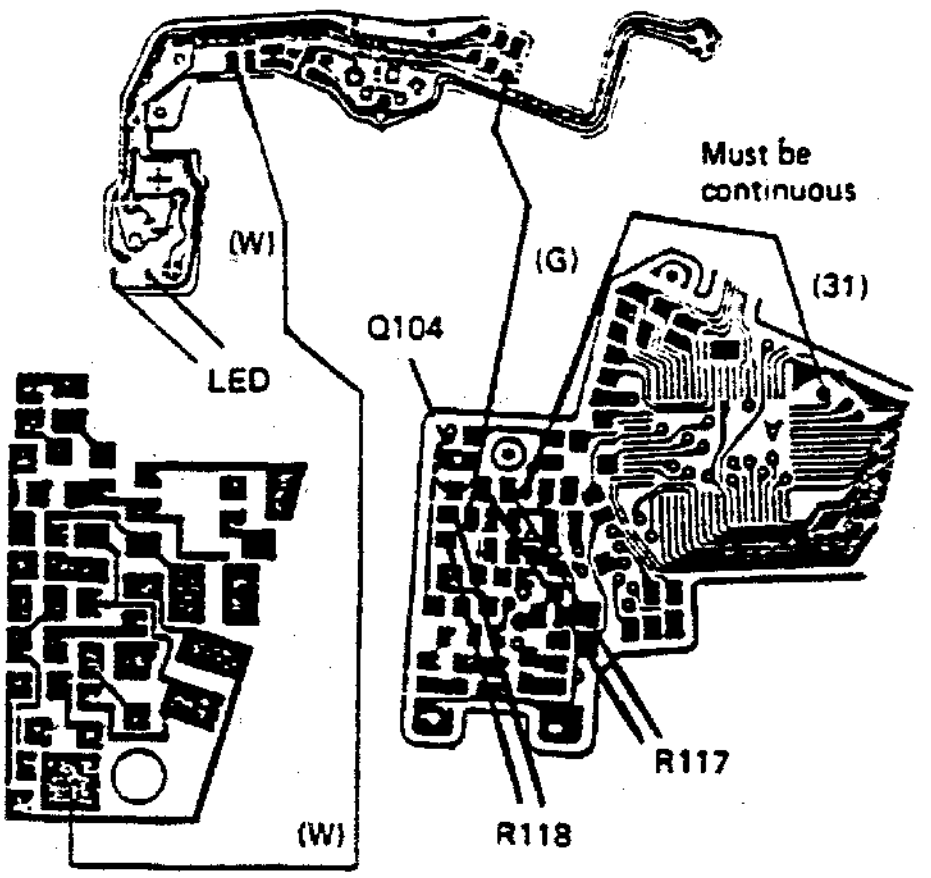
BC and SELF LED not light



6. MEMO LED only not light

(1) U circuit board defective
(2) (W) lead wire broken
(3) R117 broken
(4) Pattern broken
(5) CPU leg No. 31 improperly soldered
(6) LED defective

MEMO LED not light



7. LED kept lit (cannot be extinguished)

(1) MEMO LED not extinguished
Q104 shorted or broken
(2) LAMP LED not extinguished
Q105 shorted or broken
(3) FLASH LED not extinguished
Q106 shorted or broken
(4) SELF LED not extinguished
Q401 shorted or broken

8. LED lit momentarily during mode switching

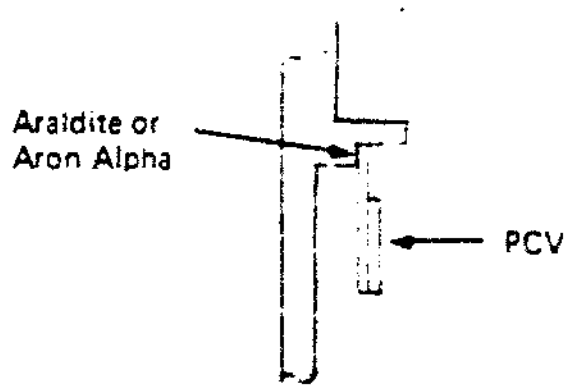
See "Reset Circuit Abnormal" on page E-200.

3-12 PCV Defective

- LCD indication is normal

1. Sounding too low

- Improper bonding of PCV
  Bond PCV to front plate with Aron Alpha or Araldite.

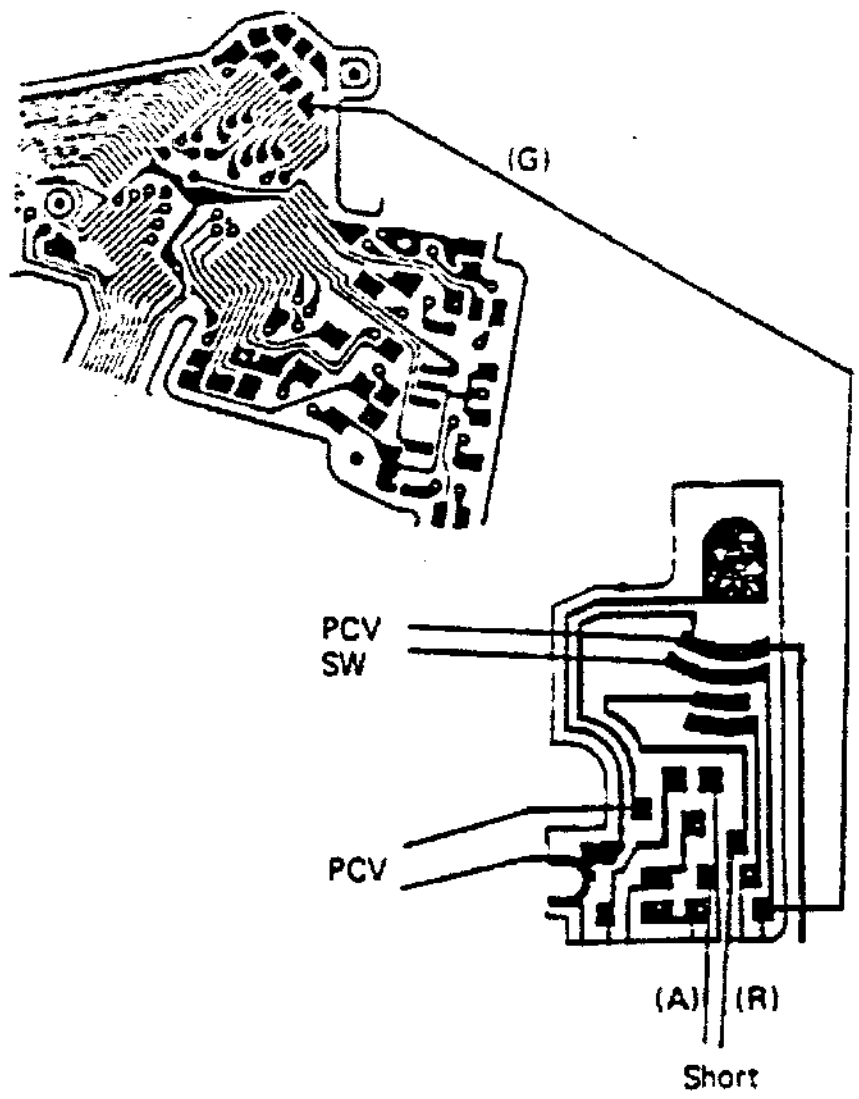


2. PCV not sound

(1) PCV SW defective
(2) (G) lead wire broken
(3) B.P. leg No. 25 defective

3. PCV sounds at short intervals in SELF mode

(1) (A) and (R) lead wires shorted on CE circuit borad.



3-13 Reset Circuit Defective

- LED lights for a very short time when reset circuit is activated by turning mode selector lever.
- Reset function is ineffective

1. Reset function ineffective upon mode switching

(1) C902 broken
(2) Lead wire broken (black, orange or green)

2. Auto reset function ineffective

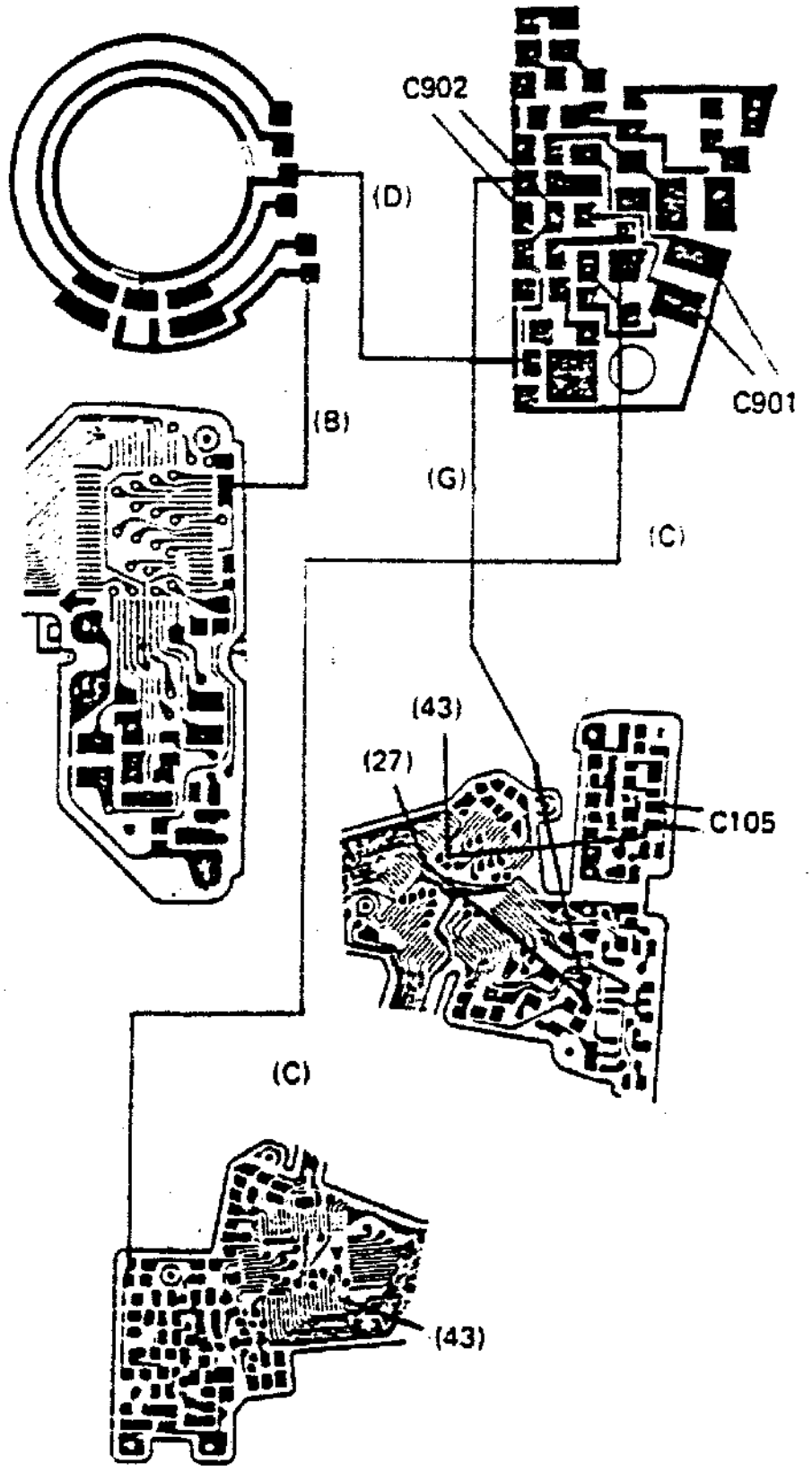
(1) C105 shorted or broken
(2) B.P. leg No. 43 or 27 improperly soldered
(3) Pattern broken

3. Both reset and auto reset functions ineffective upon mode switching

- LED extinguished (normal)
- CPU leg No. 43 improperly soldered

4. Flash LED (MEMO and B. C. LED) light upon mode switching and auto reset

(1) C901 broken or improperly soldered
(2) (C) lead wire improperly soldered

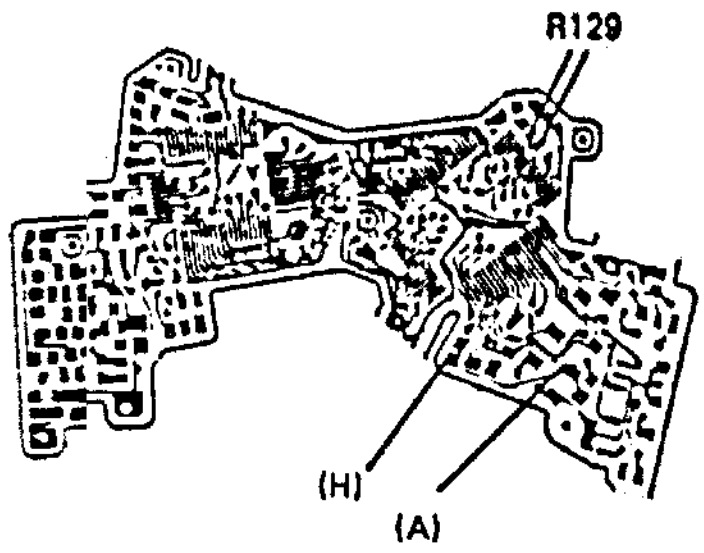


3-14 Reference Voltage Vref Abnormal

1. Vref = 3 V

(1) Gray lead wire of AV shorted to camera body
(2) Blue lead wire of TV shorted to camera body
(3) R129 shorted or broken

Check in 1.



2. Vref = 2.3 V

- Triplet resistors or related part defective

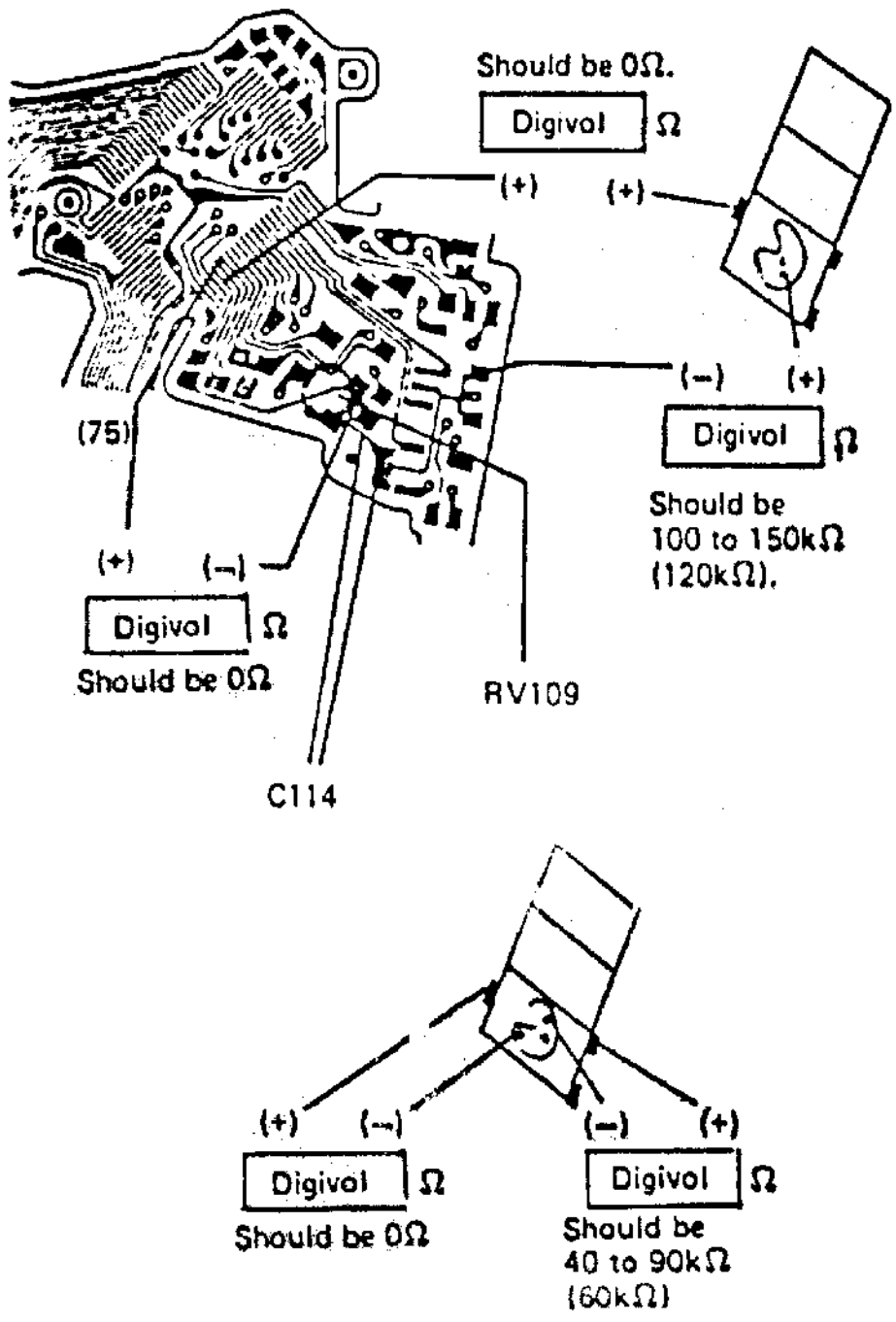
3. Vref = 1 V

- Triplet resistors or related part defective

4. Vref = 0 V

(1) C114 shorted or broken
(2) Pattern broken

Check in 2, 3 or 4



3-15 DAC Adjusting Circuit Defective

- Adjustment impossible with variable resistor
- Indication abnormal regardless of accurate matching
- Other symptoms

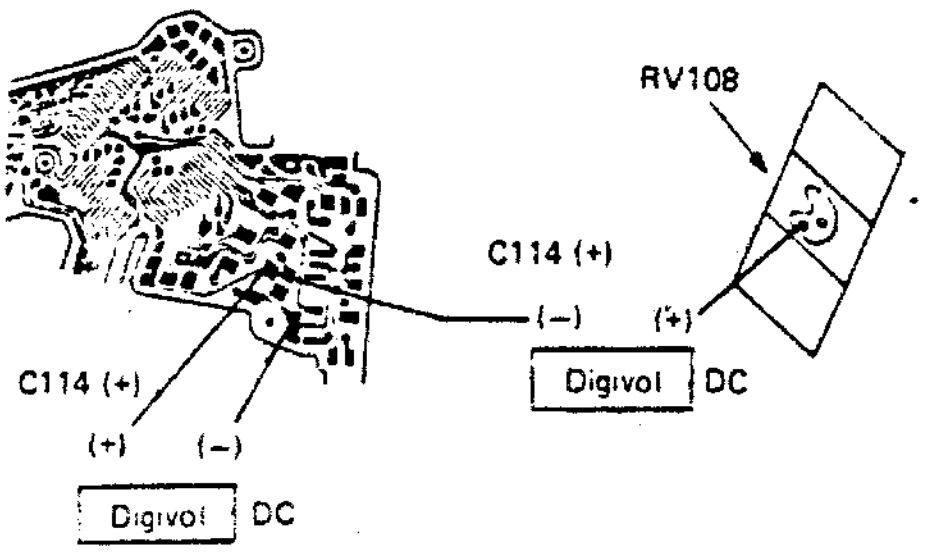
- Check procedures

1. Check of output voltage Vref = 1.8 V

2. Check of DAC adjustment with RV108

- Voltage should be varied from 0 to 200 mV by turning the variable resistor (Vref taken as standard).

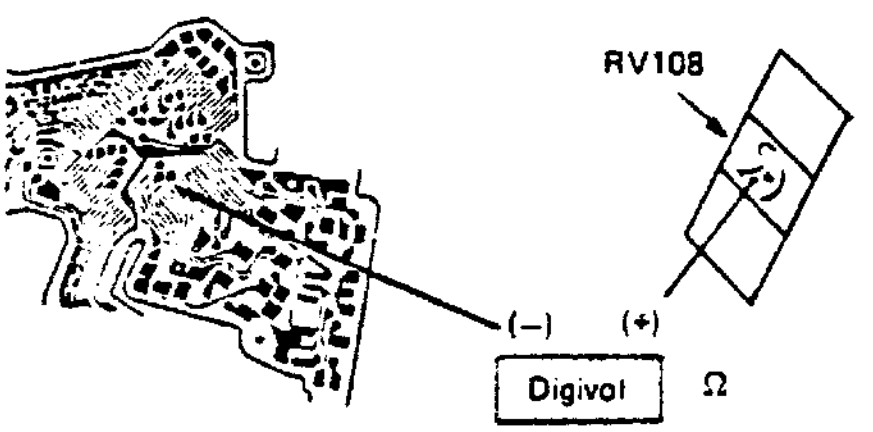
  (1) Clean or replace RV108.
  (2) Wire breakage between RV108 and B.P. leg No. 70
  (3) B.P. leg No. 70 improperly soldered



Vref check

3. Indication abnormal regardless of accurate matching

- Check B.P. legs Nos. 10, 11 and 12.
- Check CPU legs Nos. 4, 5 and 6.



3-16 Misadjustment of ± Compensation

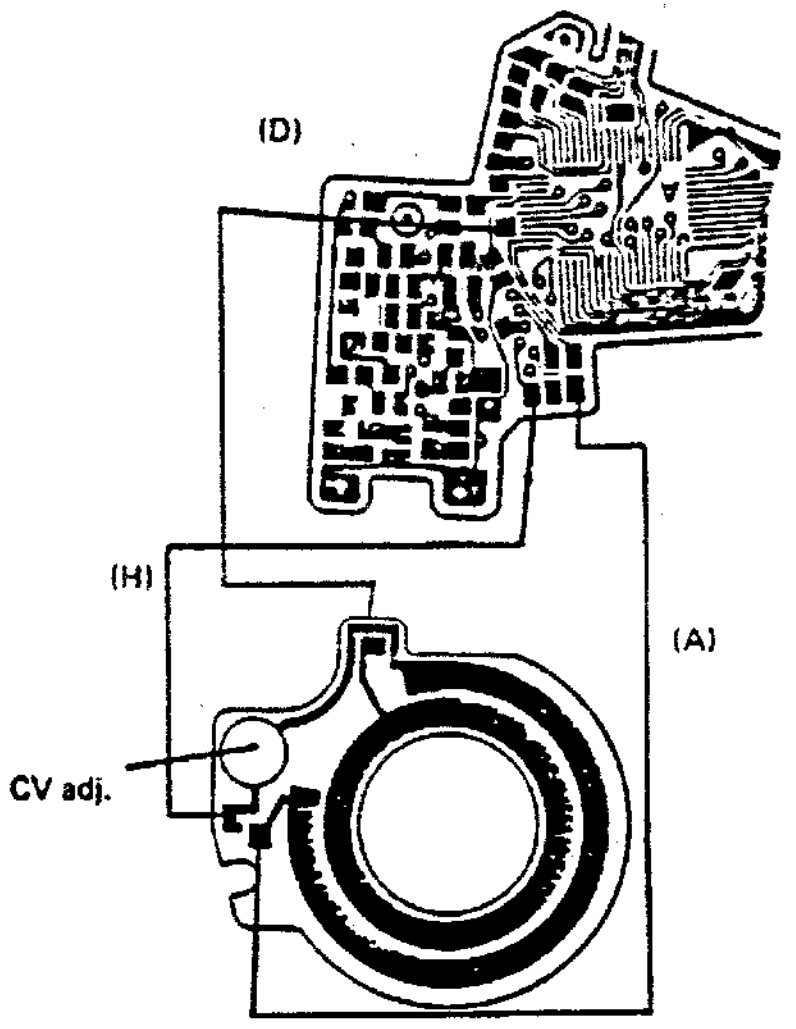
- ± compensation impossible

1. Poor contact on CV contact

2. Check lead wire and pattern

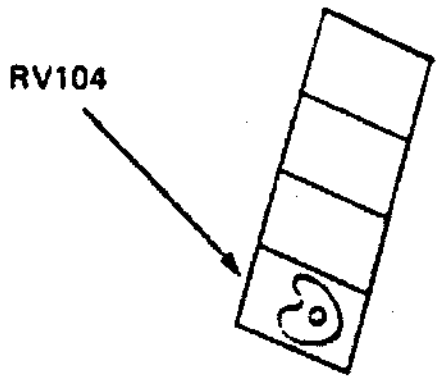
3. CV adj. resistor defective

4. RV104 defective



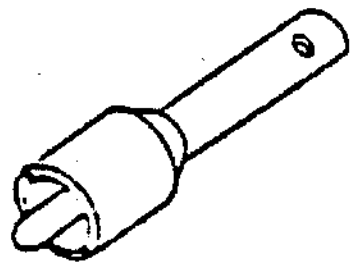
Quartette resistors

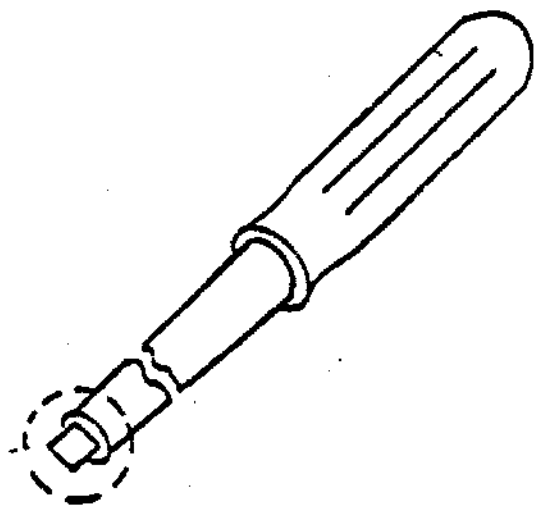
- Clean variable resistor. If cleaning is ineffective for correcting trouble, replace variable resistor with a new one.

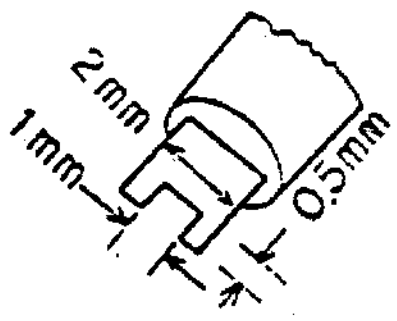


H. LIST OF SPECIAL JIGS AND TOOLS

Name of tool	Application	Remarks
1. KC-CE5648 Lever nut wrench	For tightening Lever nut CE564800	Incompatible with the lever nut having a narrow slit which was manufactured at the initial production stage.
2. KC-CE5683 ASA cover holder wrench	For tightening ASA Cover holder stopper CE568300	
3. OT1057 high-frequency screwdriver	For adjusting variable resistor	Machine tip of the high-frequency screwdriver with a file as shown below:







Depth of groove equal to plate thickness (t 0.5 mm)

I. DESCRIPTION OF MECHANISM

CONTENTS

I. OUTLINE ..... I- 1
II. PHOTOGRAPHING MODES ..... I- 2
1. Classification of Photographing Modes ..... I- 3
2. Application of Photographing Modes ..... I- 4
2-1. Auto Mode ..... I- 4
2-2. Manual Mode ..... I- 6
2-3. Bulb Mode ..... I- 7
2-4. Battery Check Mode ..... I- 7
III. DESCRIPTION OF MECHANISMS ..... I- 7
1. Mechanical 1/60 Sec. Mechanism ..... I- 7
2. Electromagnetic Shutter Lock Mechanism ..... I- 8
3. Mechanism to Prevent Film Winding during Exposure Time ..... I- 8
4. Dioptry Adjusting Mechanism ..... I- 9
IV. DESCRIPTION OF ELECTRIC CIRCUITS I-10
1. Basic Operations for Indication within Veiwfinder and Film Exposure I-10
1-1. Conception of Each Circuit I-10
1-2. Block Diagram I-11
1-3. Operating Sequence for Indicating Light Measurement I-12
1-4. Operating Sequence for Controlling Shutter Speed I-13
2. Description of Electric Parts I-15
2-1. ICs I-15
2-2. Switches I-16
2-3. Transistors I-18
2-4. Diodes I-18
2-5. Resistors I-18
2-6. Capacitors I-20
2-7. Variable Resistors I-21
2-8. Thyristors I-21
2-9. LEDs I-22
2-10. Control Magnets I-22
2-11. Connectors I-22
2-12. Crystal Oscillators I-22
2-13. LCDs I-22
2-14. PCV I-22

3. Description of Electric Circuits I-22
3-1. CPU I-22
3-2. Bipolar IC I-29
3-3. Head Amplifier IC I-32
3-4. LCD Driver I-35
3-5. RS Circuit Board I-36
3-6. External Circuit for IC I-00
DESCRIPTION OF PHOTOGRAPHING OPERATIONS I-43
1. Difference between Light Measurement for Indication and Light Measurement for Exposure I-43
1-1. Light Measurement for Indication I-43
1-2. Light Measurement for Actual Exposure I-43
1-3. Relationship between Light Measurement for Indication and Light Measurement for Exposure I-43
2. Sequence of Photographing Operations I-44
3. Exposure Program Flow Chart I-47
4. Indication & Exposure Time Chart I-48

I. OUTLINE

Though OM-4 is designed basically on the basis of the preceding Model PM-2, it can exhibit far higher performance and features the chief meris mentioned below:

1. Spot light measurement is possible in both the auto and manual modes.
2. Spot light measurement is possible at multiple points.
3. Exposure values can be stored for a long time.
4. HI LIGHT and SHADOW modes are prepared for photographing.
5. The viewfinder adopts a liquid crystal cell assuring legible indications.
6. The view finder is equipped with a dioptmetric corrector.
7. A mechanical shutter speed of 1/60 sec. is available.
8. The shutter can provide high speeds up to 1/2000 sec.

Owing to these features, Model OM-4 permits freely controlling exposure for photographing in rear light and depending on difference in brightness of background.

Further, the viewfinder is so designed as to facilitate focusing even for short-sighted and long-sighted persons. In addition, the mechanical shutter time is prepared so as not to lose shuttering change should the battery becomes exhausted. Therefore, Model OM-4 has opened a far wider photographing range. In order to achieve this purpose, Model OM-4 adopts sophisticated circuits mentioned below:

1. Auto circuit of direct light measurement type.
2. Auto circuit of light measurement memory type (SPOT)

Further, the instrument incorporates two unique exposure control EE mechanisms.

Moreover, manual circuit, high light circuit, shadow circuit, strobe circuit, memory and so on are built in to compose the high-grade circuit of Model OM-4.

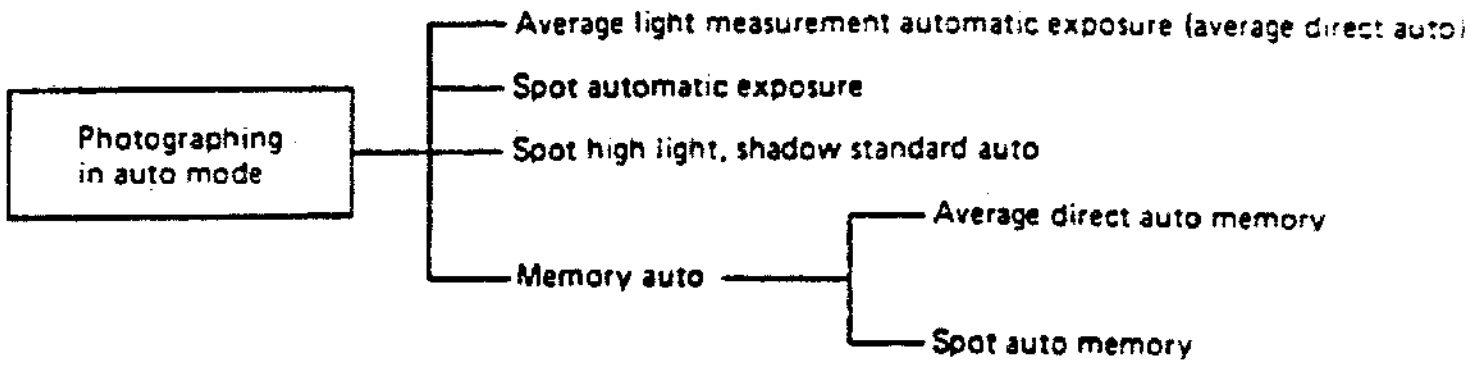
The most advanced 4-bit microcomputer and bipolar IC have been developed as the main components of the electrical circuits.

In addition, OM-4 is equipped with specially developed high performance mechanisms such as shutter mechanism featuring high accuracy, high speed travelling stability, high speed of 1/2000 sec. as well as mechanical speed of 1/60 sec., electromagnetic shutter lock mechanism, mechanism to prevent film winding during exposure time, dioptric correction mechanism and large legible liquid crystal display.

II. PHOTOGRAPHING MODES

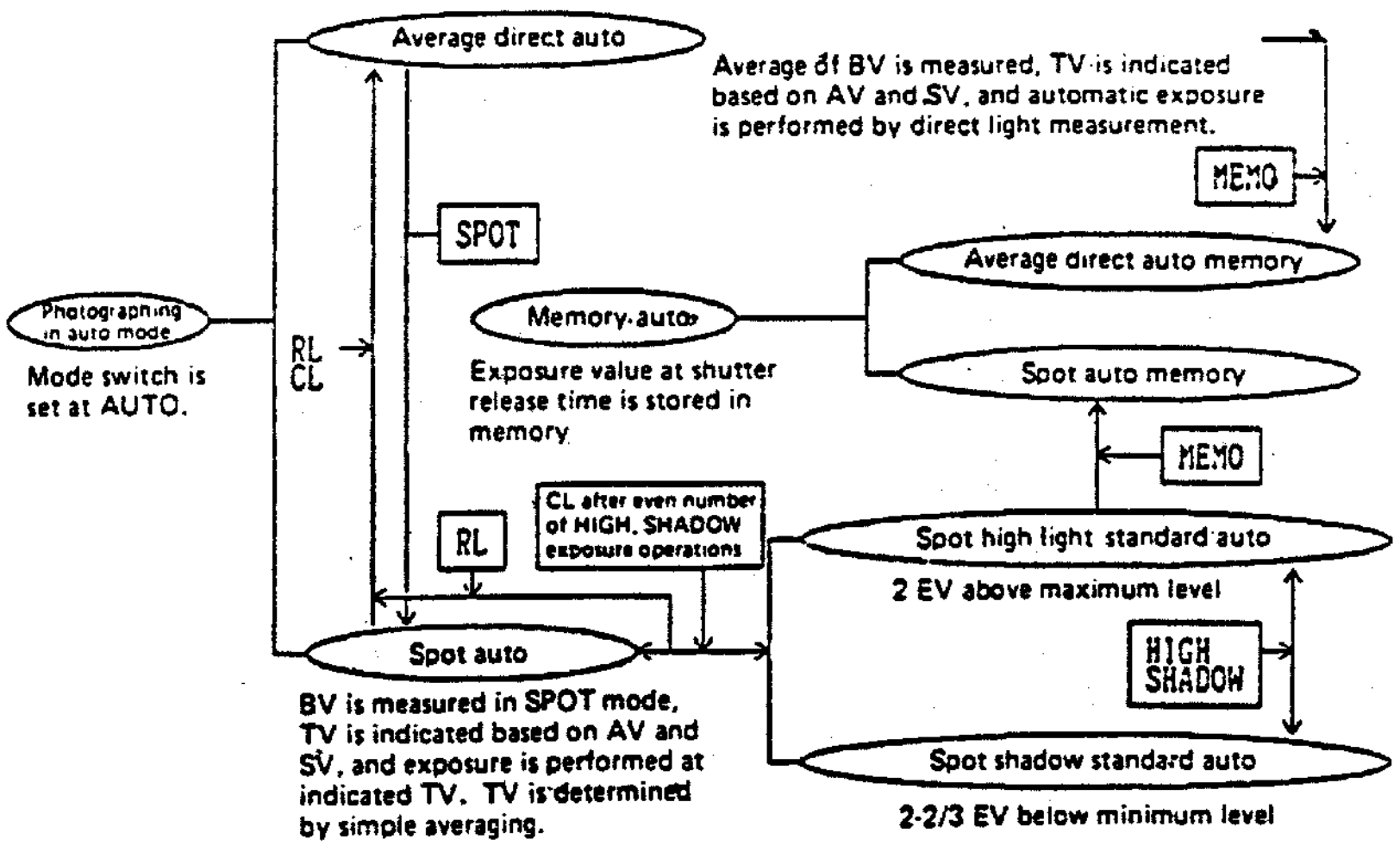
Model OM-4 is designed basically for four photographing modes: auto mode, manual mode, strobe mode and spot mode.

1. Classification of Photographic Modes

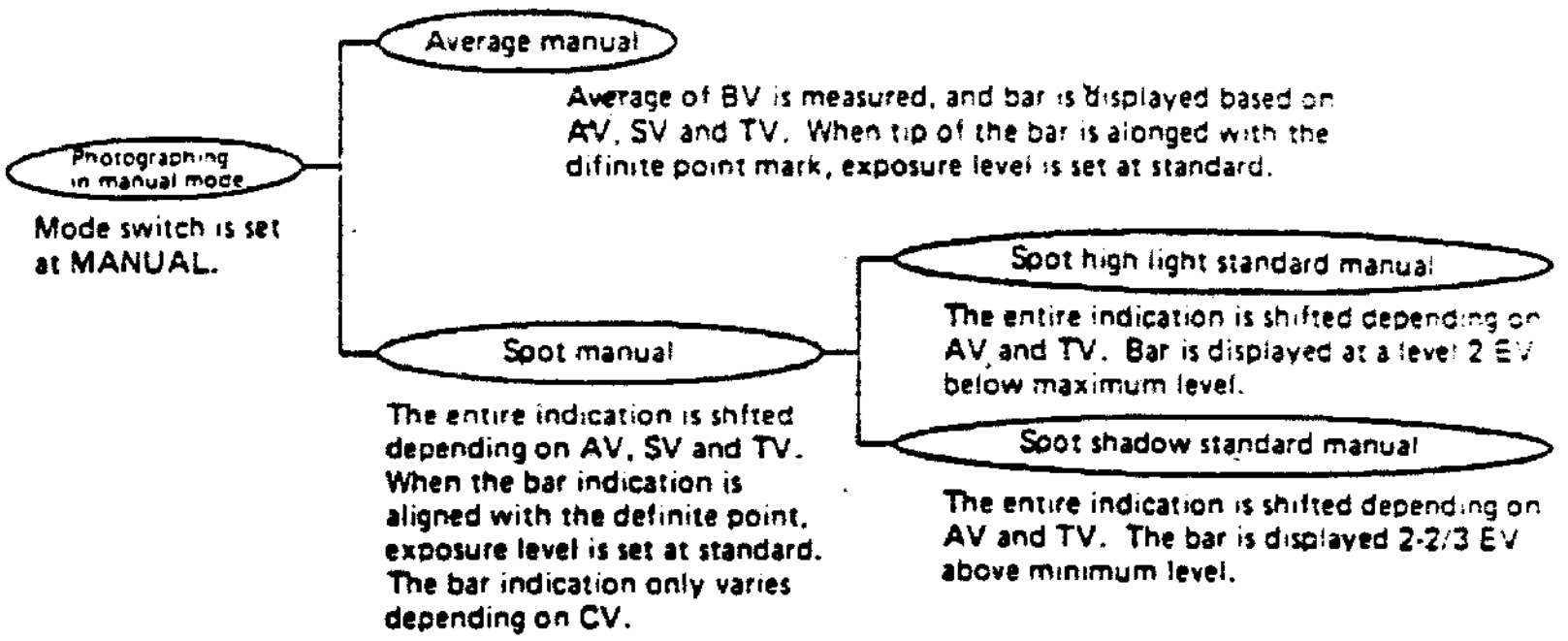

Photographing in auto mode
Average light measurement automatic exposure (average direct auto)
Spot automatic exposure
Spot high light, shadow standard auto
Memory auto
Average direct auto memory
Spot auto memory

RL: Release
CL: Clear

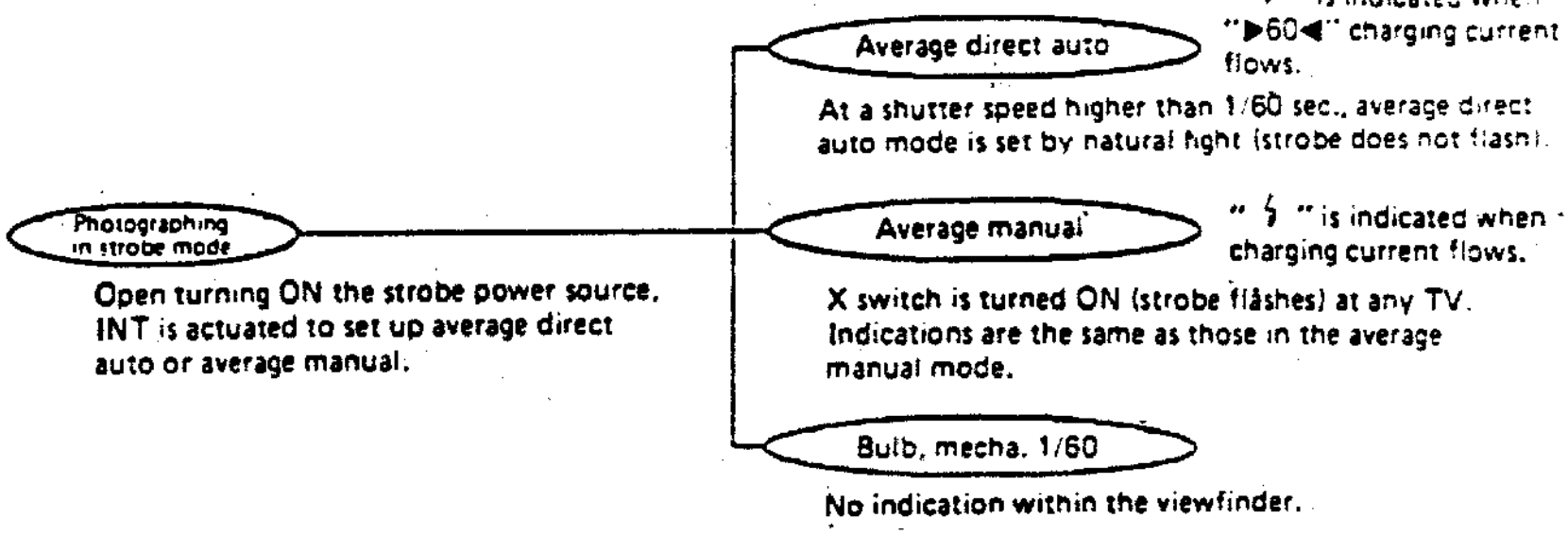
TV: Shutter speed
AV: Aperture value
SV: ASA value
BV: Brightness of object to be photographed


Average direct auto
Average of BV is measured, TV is indicated based on AV and SV, and automatic exposure is performed by direct light measurement.
MEMO
SPOT
Average direct auto memory
Photographing in auto mode
Mode switch is set at AUTO.
RL
CL
Memory auto
Exposure value at shutter release time is stored in memory
Spot auto memory
MEMO
CL after even number of HIGH, SHADOW exposure operations
RL
Spot high light standard auto
2 EV above maximum level
HIGH
SHADOW
Spot auto
BV is measured in SPOT mode, TV is indicated based on AV and SV, and exposure is performed at indicated TV. TV is determined by simple averaging.
Spot shadow standard auto
2-2/3 EV below minimum level

- After the shutter is released in the spot multi-point auto mode, the camera is set in the average direct auto mode.
  Once the shutter is operated with the memory set in position, the exposure value is memorized for one hour (then it is cleared and the camera is set in the average direct mode).


Photographing in manual mode
Mode switch is set at MANUAL.
Average manual
Average of BV is measured, and bar is displayed based on AV, SV and TV. When tip of the bar is alonged with the difinite point mark, exposure level is set at standard.
Spot manual
The entire indication is shifted depending on AV, SV and TV. When the bar indication is aligned with the definite point, exposure level is set at standard. The bar indication only varies depending on CV.
Spot high light standard manual
The entire indication is shifted depending on AV and TV. Bar is displayed at a level 2 EV below maximum level.
Spot shadow standard manual
The entire indication is shifted depending on AV and TV. The bar is displayed 2-2/3 EV above minimum level.

- CV: Corrected exposure value


Photographing in strobe mode
Open turning ON the strobe power source. INT is actuated to set up average direct auto or average manual.
Average direct auto
" ϟ " is indicated when "▶60◀" charging current flows.
At a shutter speed higher than 1/60 sec., average direct auto mode is set by natural light (strobe does not flash).
Average manual
" ϟ " is indicated when charging current flows.
X switch is turned ON (strobe flashes) at any TV. Indications are the same as those in the average manual mode.
Bulb, mecha. 1/60
No indication within the viewfinder.

2. Application of Photographic Modes

2-1. Auto Mode

1. Automatic exposure by average light measurement (average direct auto)
   - Average of BV (brightness of object to be photographed) is measured, and a bar is displayed on LCD as a shutter speed (TV) to be adopted as standard exposure level based on AV (aperture value), SV (ISO) and CV (corrected exposure value).
   - When the main switch is turned ON, the mirror is raised to set up the stop down condition, and automatic exposure is perfomed in the direct light measurement mode in which reflection light from the shutter blind and film surface is measured.
   - The average direct mode is kept even after the shutter is released.

2. Automatic exposure by spot light measurement (spot auto)
   - The spot auto mode is set up by turning ON the SPOT key in the average direct auto mode.
   - In this mode, BV (brightness of object to be photographed) is measured at a spot and the measured value is entered. A dot and a bar are displayed on LCDs as a shutter speed to be adopted as standard exposure level based on AV and SV.
   - The bar only is shifted for correcting exposure.
   - When the SPOT key is turned ON in the spot auto mode, a new spot measurement value is entered. A shutter speed determined based on the value is indicated by a dot and another shutter speed determined by simply averaging the entered spot measurement value is indicated by a bar.
   - 8 spot measurement values can be stored at a time. Old values are cleared to enter new values.
   - In each spot mode, brightness of object to be photographed is always measured at a spot, and a shutter speed determined based on the measured value is indicated by a dot.
   - When the main switch is turned ON in the spot mode, film is exposed at the shutter speed indicated by the var.
   - Once the shutter is operated, the spot mode and all the spot input values are cleared, and the camera is set in the average direct mode.

3. Spot auto (HILIGHT, SHADOW CONTROL)
   - In the spot auto mode, photographing conditions are switched as follows:
     1. HILIGHT CONTROL mode is set up by turning ON the HILIGHT key in the SPOT SHADOW mode.
     2. SHADOW CONTROL mode is set up by turning ON the SHADOW key in the SPOT HILIGHT mode.
     3. SPOT AUTO mode is set up by turning ON the HILIGHT key in the HILIGHT CONTROL mode.
     4. SPOT AUTO mode is set up by turning ON the SHADOW key in the SHADOW CONTROL mode.
   - In the HILIGHT CONTROL or SHADOW CONTROL mode, entry of the spot input and dot indication are the same as those in the SPOT mode.
   - In the HILIGHT CONTROL mode, the bar indicates a shutter speed 2 EV higher than the maximum brightness of the spot input values.
   - In the SHADOW CONTROL mode, the bar indicates a shutter speed 2-2/3 EV lower than the minimum brightness of the spot input values.
   - When the main switch is turned ON in these modes, film is exposed at the shutter speed indicated by the bar.
   - Once the shutter is operated, the spot mode (including HILIGHT CONTROL and SHADOW CONTROL) and all the spot inputs are cleared, and the camera is set in the average direct auto mode.

4. Memory auto

(1) Average direct auto memory

- When the main switch is turned ON with the memory set (by turning ON the MEMO key) in the average direct auto mode, film is exposed in the average direct auto mode and the exposure value is stored in the memory.
- The stored exposure value is stored for 60 minutes after the shutter is operated. Then the memory is cleared and the camera is set in the average direct auto mode.
- In the memory hold mode, the bar indicates a shutter speed to be adopted as standard level based on BV (brightness of object to be photographed), VS (ASA value), AV (aperture value) and CV (corrected exposure value).
- When the main switch is turned ON in the memory hold mode, film is exposed at the shutter speed indicated by the bar.

(2) Spot auto memory

- When the main switch is turned ON in each spot auto mode (SPOT, HILIGHT or SHADOW), film is exposed at the shutter speed determined in the set mode and the exposure value is stored in the memory.
- The stored exposure value is stored for 60 minutes after the shutter is operated. Then, the memory and spot mode are cleared, and the camera is set in the average direct mode.
- In the memory hold condition of the spot auto mode, the conditions for the AVERAGE, HILIGHT CONTROL and SHADOW CONTROL as well as indications are kept the same as those before turning ON the main switch.
- In the memory hold condition, the SPOT, HIGH and SHADOW keys are ineffective. (A new key input is invalid so long as the memory is reset.)
- When the main swtich is turned ON in the memory hold condition, film is exposed at the shutter speed indicated by the bar.

5. Auto strobe

- The strobe photographing mode is set up by turning ON the strobe power source in each auto mode.
- When the strobe power source is turned ON even in the spot auto memory (set or hold condition), it is cleared automatically and the camera is set in the average direct auto mode.
- In the auto strobe photographing mode, the bar indicates a shutter speed determined based on average of BV (brightness of object to be photographed), AV (sperture value) and CV (corrected exposure value) in the same manner as in the average direct auto mode.
- When the main switch is turned ON while a shutter speed of 1/60 or lower is indicated, the strobe is flashed and its light is subjected to TTL auto control.
  Shutter speed is set at 1/60 sec. in this condition.
- When the main switch is turned ON while a shutter speed higher than 1/60 sec. is displayed, the strobe is not flashed and automatic film exposure to natural light is performed under the TTL direct light measurement control.
- When the strobe power source is turned OFF in the auto mode, the camera is set in the average direct auto mode.
- For 2 seconds after photographing in the strobe mode, the following indications are provided:
  1. The UNDER LCD flickers with strobe LED extinguished if strobe light intensity is too low.
  2. The OVER LCD flickers with strobe LED extinguished if strobe light intensity is too high.
  3. The strobe LED flickers when light control is proper.

2-2. Manual Mode

1. Average manual mode
   - Average of BV (brightness of object to be photographed) is measured, standard exposure time is determined based on AV, SV, CV and TV, and deviation from the standard level (positive or nagative EV value) is indicated by the bar.
     In this case, the standard exposure level is reached when tip of the bar is aligned with definite point mark "▶|◀".
   - When the main switch is turned ON in this mode, film is exposed at the set shutter speed.
   - The camera is kept in the average manual mode even after the shutter is released.

2. Spot manual mode
   - The spot manual mode is set up by turning ON the SPOT key in the average manual mode.
   - In the spot manual mode, BV (brightness of object to be photographed) is measured at a spot and entered. The dot and bar indicate deviation from the standard exposure level based on AV, SV and TV.
   - The bar only indicates corrected value when exposure is corrected.
   - When the SPOT key is turned ON in the spot manual mode, a new spot light measurement value is entered and the dot indicates an exposure level determined based on the new value.
     Simultaneously, the bar indicates an exposure level determined based on an average of spot inputs at two or more points.
   - 8 spot inputs max. can be stored at a time. New data are entered while discarding the old data.
   - In each spot mode, brightness of object to be photographed is always measured at a spot and the scanning dot indicates an exposure level determined based on the measured value.
   - When the main switch is turned ON in this mode, film is exposed at the set shutter speed.
   - The camera is set in the average manual mode after the shutter is released.

3. Spot manual mode (HILIGHT, SHADOW CONTROL)
   - In this spot manual mode, photographing conditions are switched as follows:
     1. The HILIGHT CONTROL mode is set up by turning ON the HILIGHT key in the SPOT SHADOW mode.
     2. The SHADOW CONTROL mode is set up by turning ON the SHADOW key in the SPOT HILIGHT mode.
     3. The SPOT MANUAL mode is set up by turning ON the HILIGHT key in the HILIGHT CONTROL mode.
     4. The SPOT MANUAL mode is set up by turning ON the SHADOW key in the SHADOW CONTROL mode.
   - In the HILIGHT CONTROL or SHADOW CONTROL mode, entry of spot inputs and indication by the dot are the same as those in the SPOT MANUAL mode. (The dot indication does not vary.)
   - In the HILIGHT CONTROL mode, tip of the bar is located 2 EV on the negative side of the maximum brightness value of the spot inputs.
   - In the SHADOW CONTROL mode, tip of the bar is located 2-2/3 EV on the positive side of the minimum brightness value of the spot inputs.
   - When the main switch is in this mode, film is exposed at the set shutter speed.
   - The camera is set in the average manual mode after the shutter is released.

4. Manual strobe
   - The strobe photographing mode is set up by turning ON the strobe power source in each manual mode.
   - The spot mode is automatically cleared by setting up the manual strobe mode.
   - The bar indication in the manual strobe mode is the same as that in the average manual mode.
   - When the main switch is turned ON in the manual strobe mode, the strobe flashes and film is exposed at the set shutter speed.
   - When the strobe power source is turned OFF in the manual mode, the camera is set in the average manual mode.
   - The memory function is unusable in the manual mode.

2-3. Bulb Mode

- c The bulb mode is set up when shutter speed is set at B.
- c The bulb mode is set up regardless of mode switch setting.
- c When the strobe power source is turned OFF:
  - · The LCDs provide no indication in this mode.
  - · The magnet is ineffective for control when the main switch is turned ON in this mode.
  - · The battery check function is operative in this mode.
- c When the strobe power source is turned ON:
  - · The LCD provides no light measurement indication but strobe mark " ϟ " only is displayed.
  - · MG1 and MG2 are inoperative for control even when the main switch is turned ON in this mode.
  - · The battery check function is operative in this mode.

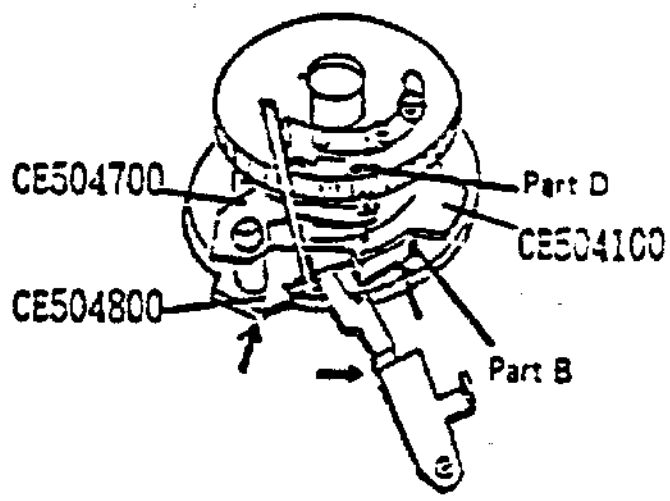
2-4. Battery Check Mode

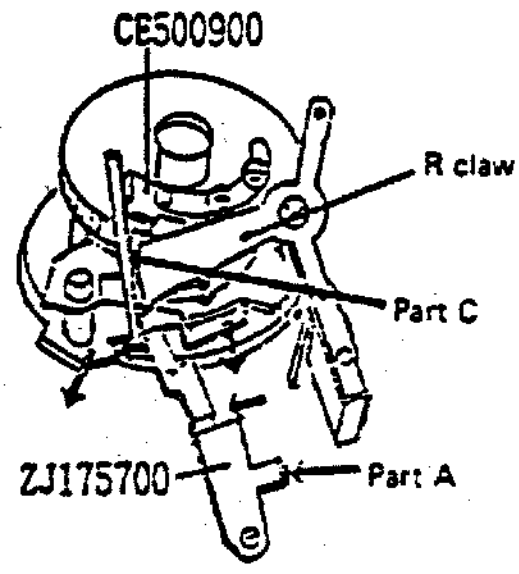
- o The battery check function is operative in all the modes so long as the battery check switch (BAT. SW) is kept ON.
- o However, the function is inoperative only during shutter release operation.
- o · When power supply voltage exceeds the warning level (2.75 ±0.05V):
  - · The battery check LED lights and PCV sounds.
- o · When power supply voltage is below the warning level:
  - · Teh battery check LED flickers and PCV sounds intermittently.
- o Power supply voltage is judged based on current consumed while the battery check LED stays lit.
- o When the battery voltage is blow the lock level (2.65 ±0.05V), the LED and PCV are inoperative.
- o The PCV can be stopped by manipulating the self-timer level.

III. DESCRIPTION OF MECHANISM

1. Mechanical 1/60 Sec. Mechanism

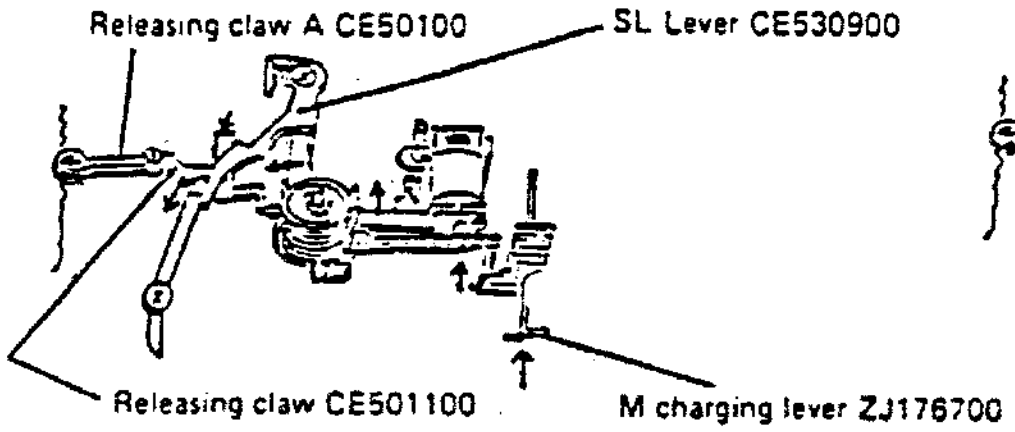
When the SD is set at 1/60 sec., the BU Lever ZJ175700 moves rightward.
Then, K Lever 2 CE504800 is brought into contact with K Cam CE504100 of gear A. Simultaneously, R Claw 2 CE504700 is engaged with convexity D of Gear plate B CE500900 to stop rotation of gear B. Further, the bulb plate holds the R claw to prevent it from going to the convexity of gear plate B.
(Part C)
When the 1st shutter blind is turned, the K cam of gear A is brought into contact with K lever 2 to push part B of the K lever outside. Therefore, the R claw disengages from the gear plate B and the 2nd shutter blind starts.
When the SD is set at 1 ~ 2000 sec., the bulb lever is pushed leftward (part A). Since the R claw and K lever 2 are pushed leftward by the bulb lever, it is impossible to stop the gear B. Since a gap is formed in part C, the R claw is capable of controlling the 2nd shutter blind.



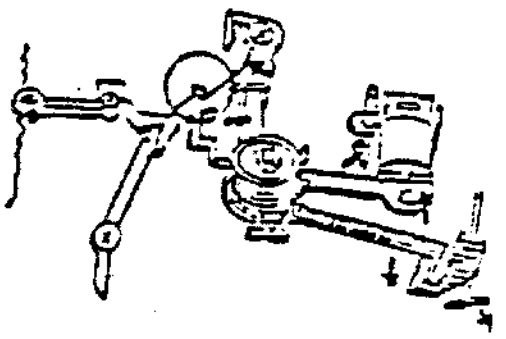


2. Electromagnetic Shutter Lock Mechanism

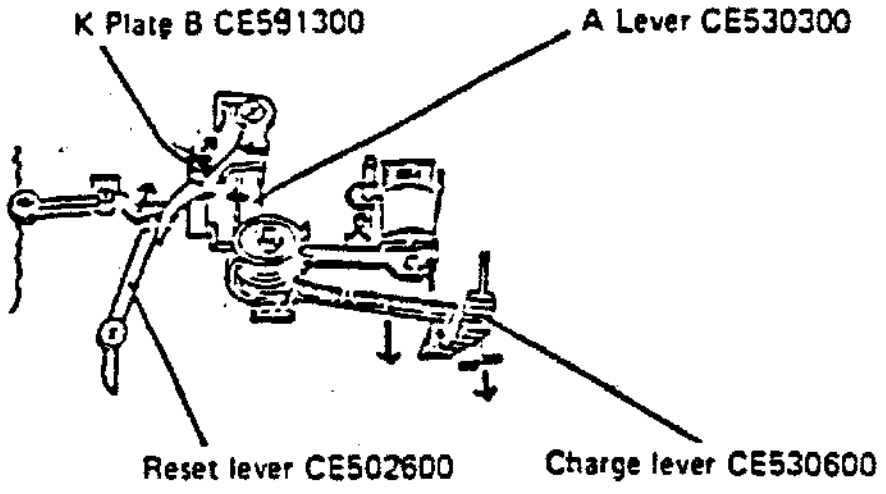
Before film winding



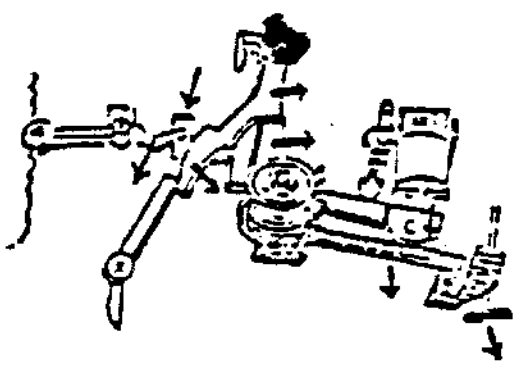
Shutter lock



After film winding

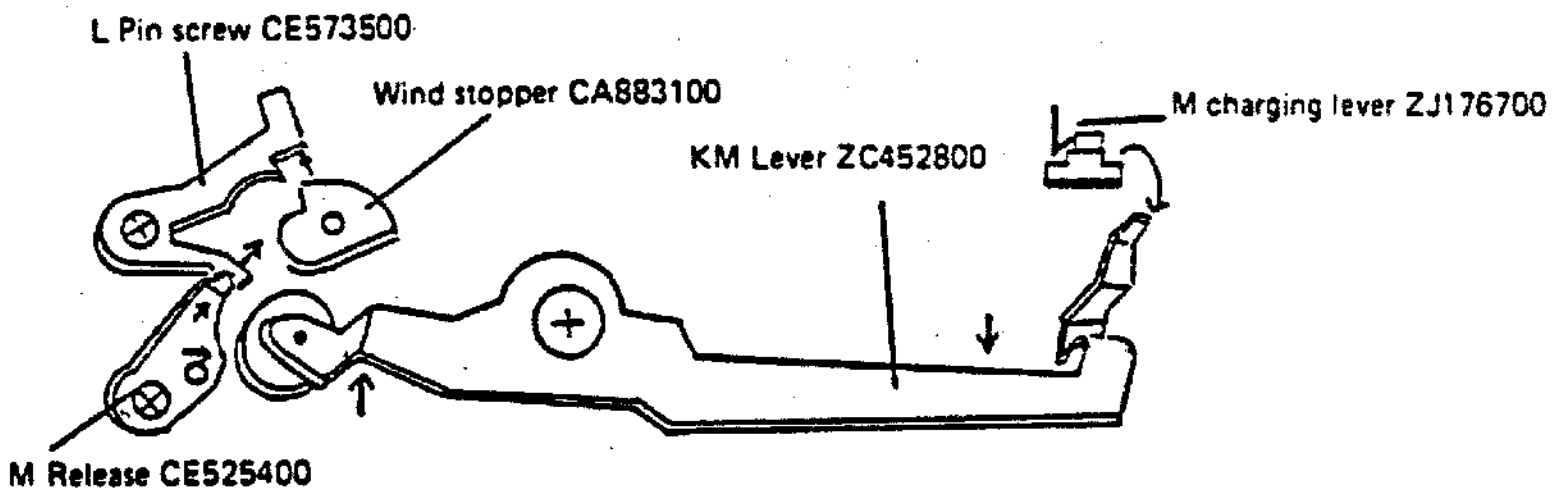


Releasing shutter lock

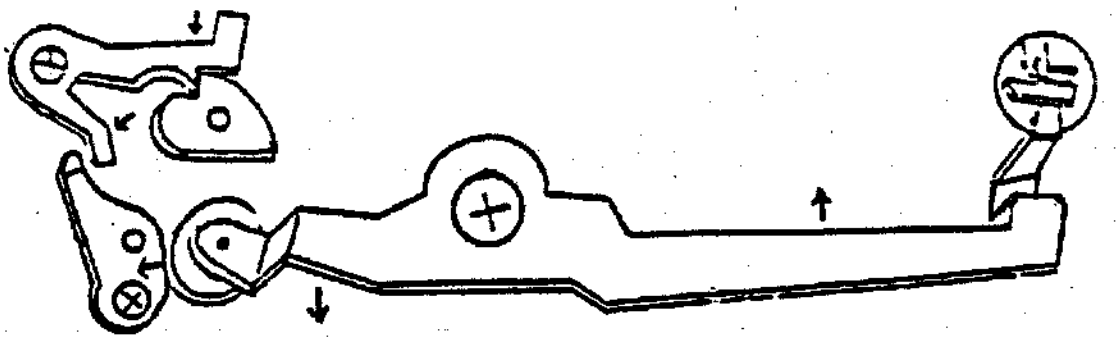


3. Mechanism to Prevent Film Winding during Exposure Time

Before film winding

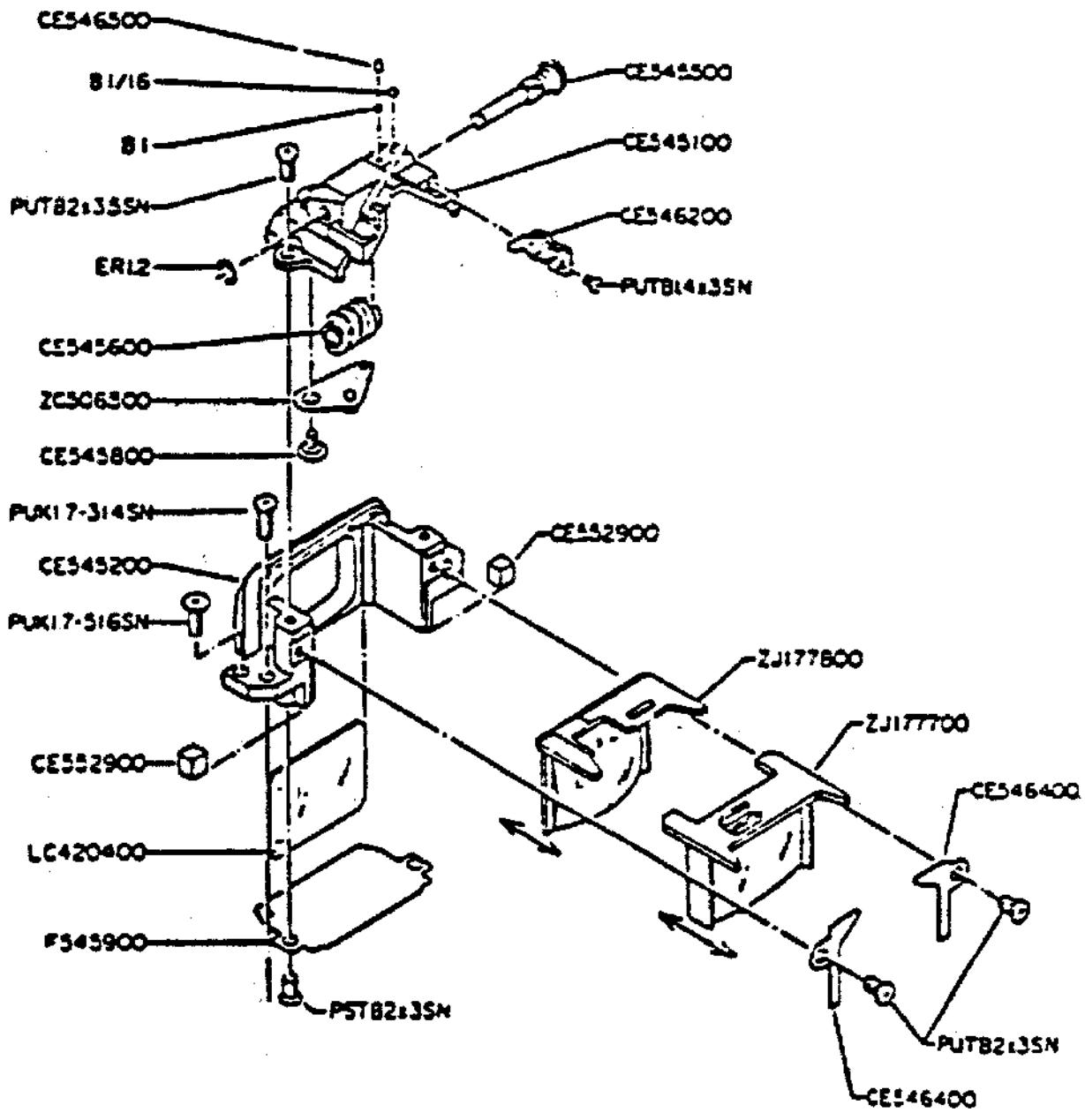


After film winding



4. Dioptry Adjusting Mechanism

By turning F Shaft CE545500, FO Frame ZJ-177700 and FT Frame ZJ177800 are shifted for dioptry adjustment.

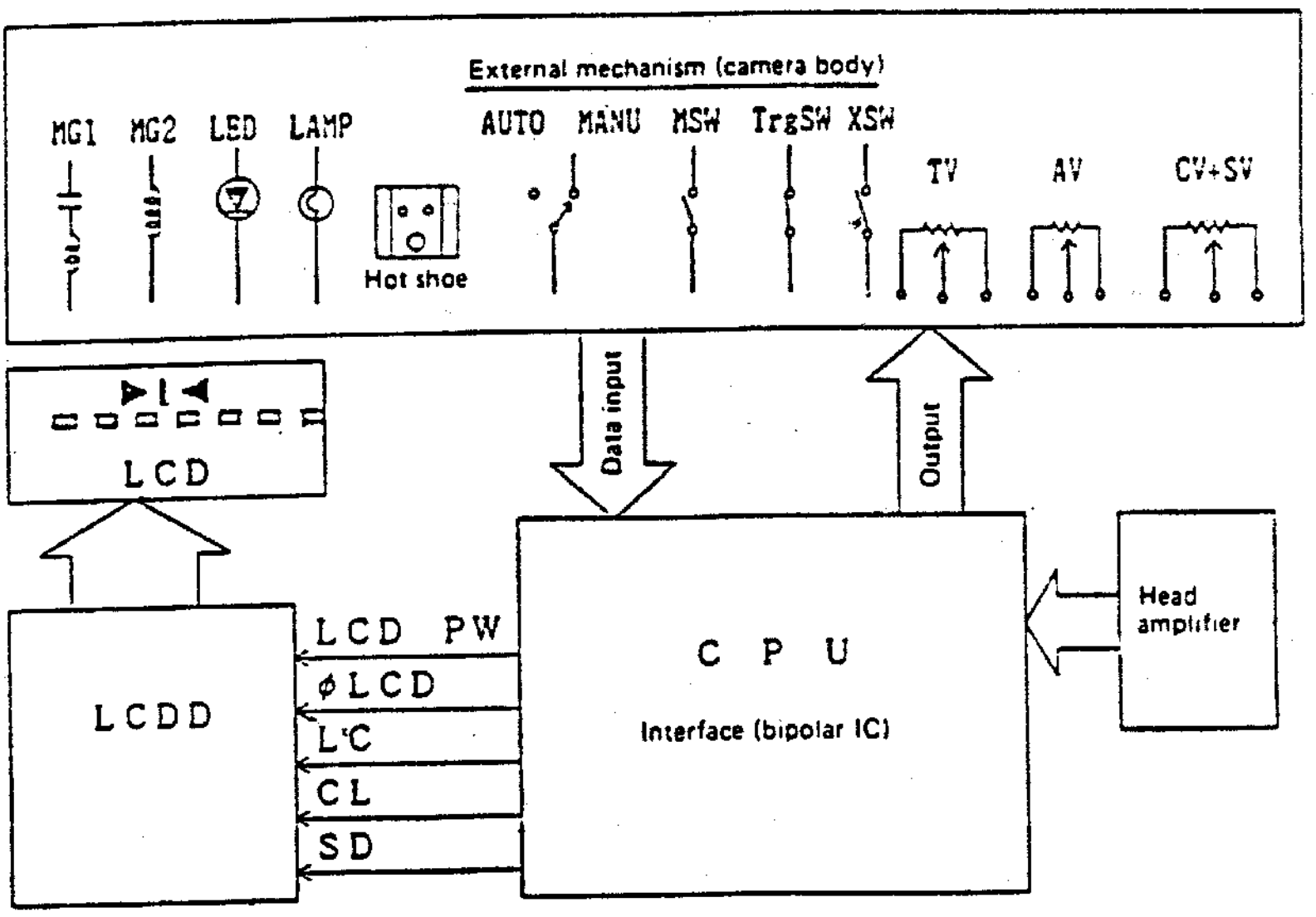


IV. DESCRIPTION OF ELECTRIC CIRCUITS

The electric circuit of Model OM-4 consists of microcomputer (IC101), bipolar IC (IC102) head amplifier (IC103) and LCD (IC104) and external circuits.

1. Basic Operations for Indication within Viewfinder

1-1. Conception of Each Circuit

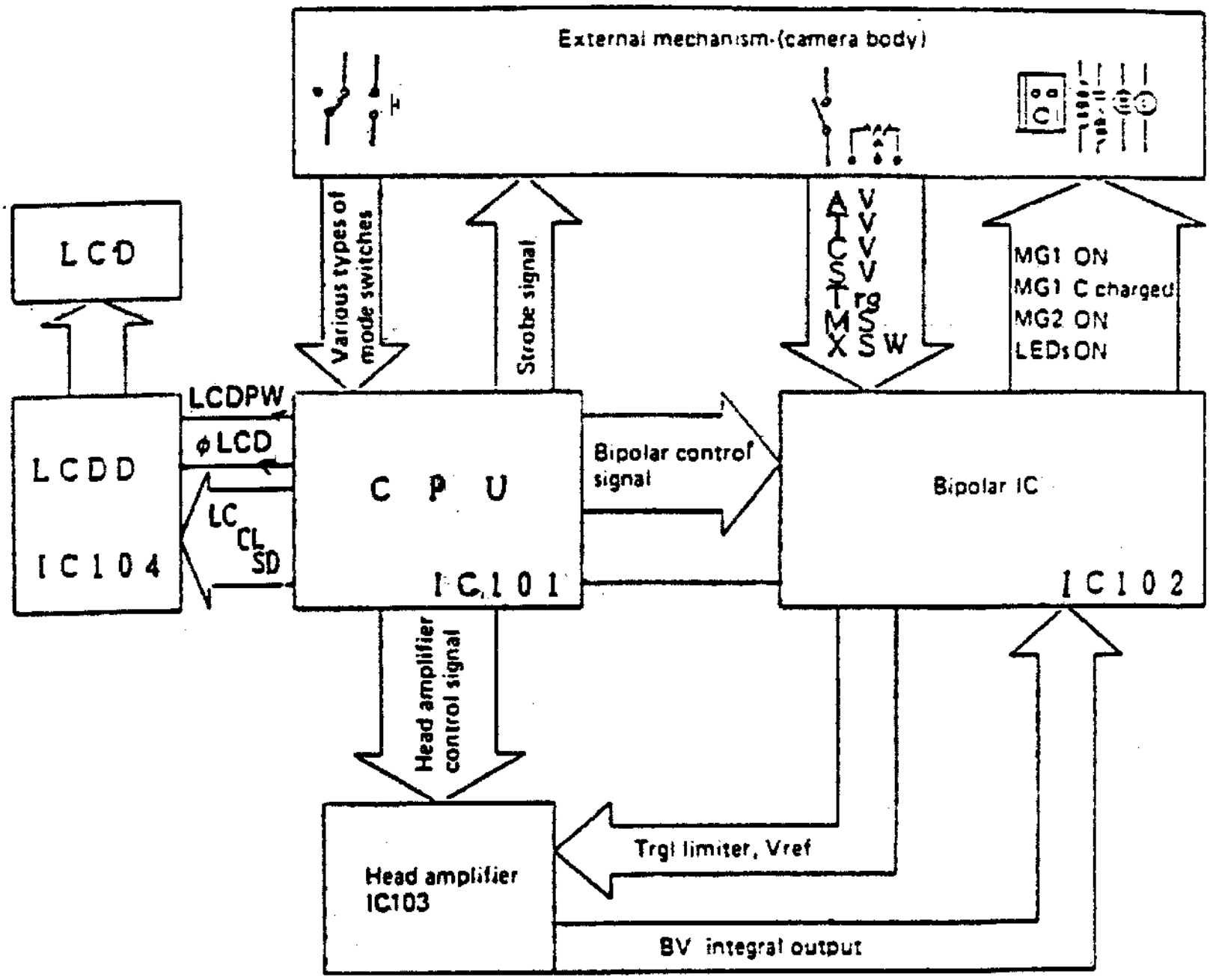


- Data from the external mechanism are collected into the CPU through the interface for arrangement and judgement, whose results are outputted to the display section of the external mechanism.
- The interface (bipolar IC) is
  "ear" to transmit data from the external mechanism to the CPU; and
  "hands and feet" to transmit judgement results from the CPU to the external mechanism.

  The CPU is
  "brain" to arrange and judge the data trnasmitted from the CPU.

  The head amplifier is
  "eyes" to allow the CPU to sense external brightness.

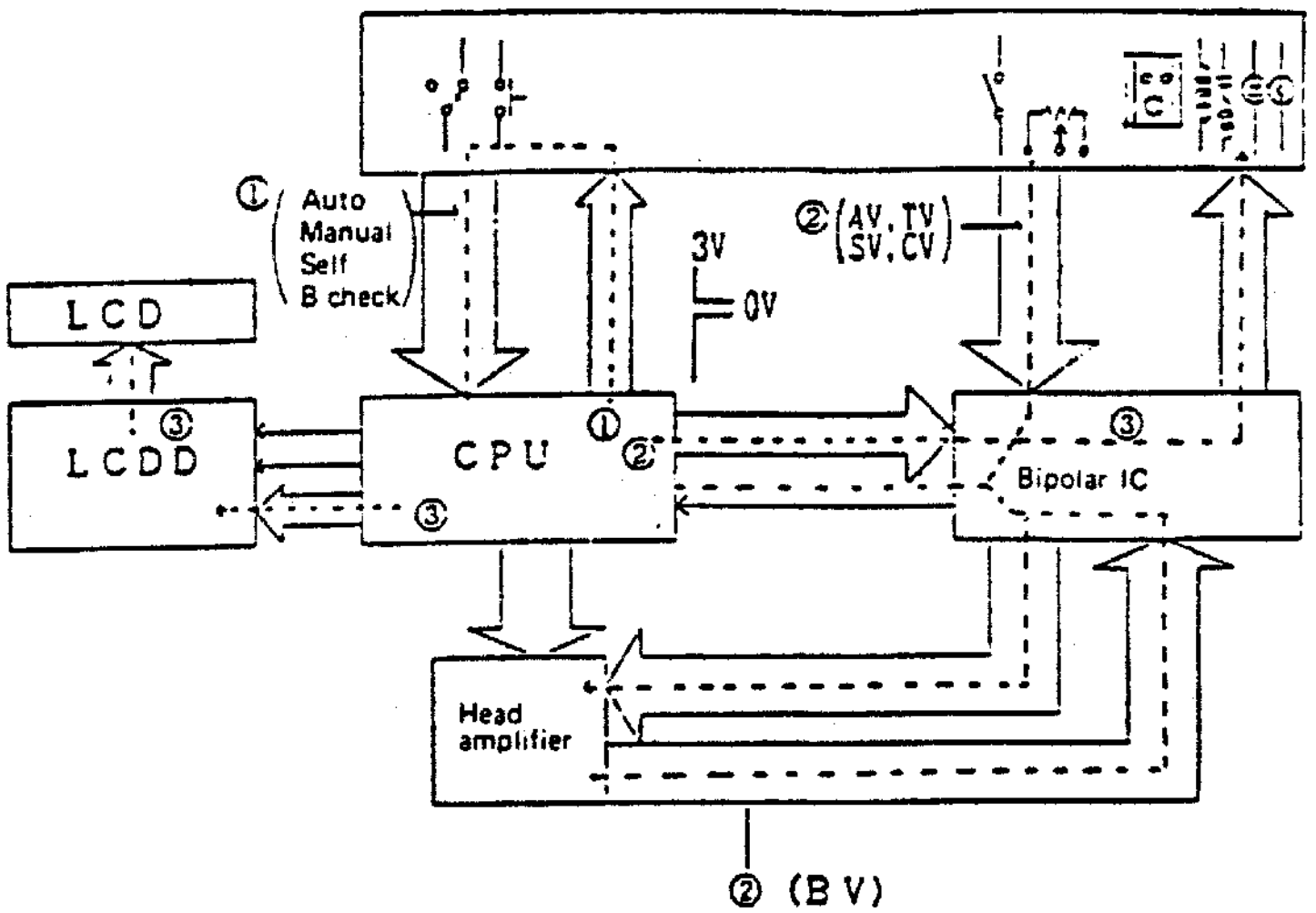
1-2. Block Diagram



- Description of signals

Head amplifier contro signal	:	Used for switching among the average, spot and direct light measurement modes.
Trg 1	:	Integration start signal to the head amplifier
Limiter	:	Signal for restricting shutter time
Bipolar control signal	:	Signal for switching various circuit blocks used by the bipolar IC
α	:	Answer signal from the bipolar IV to question from the CPU
LCDPW	:	Power control line of LCDD. The CPU turns ON and OFF the power supply through this line for power saving.
φLCD	:	Clock of LCDD. Data processing for indication on the PCD is performed in synchronization with this clock. Frequency is set at 32.8 kHz.
LC	:	Synchronous signal used for indication data transfer from the CPU
CL	:	Clock signal for transferring indication data
SD	:	Serial data signals used directly as indication data.

1-3. Operating Sequence for Light Measuremtn Indication



c Operating sequence

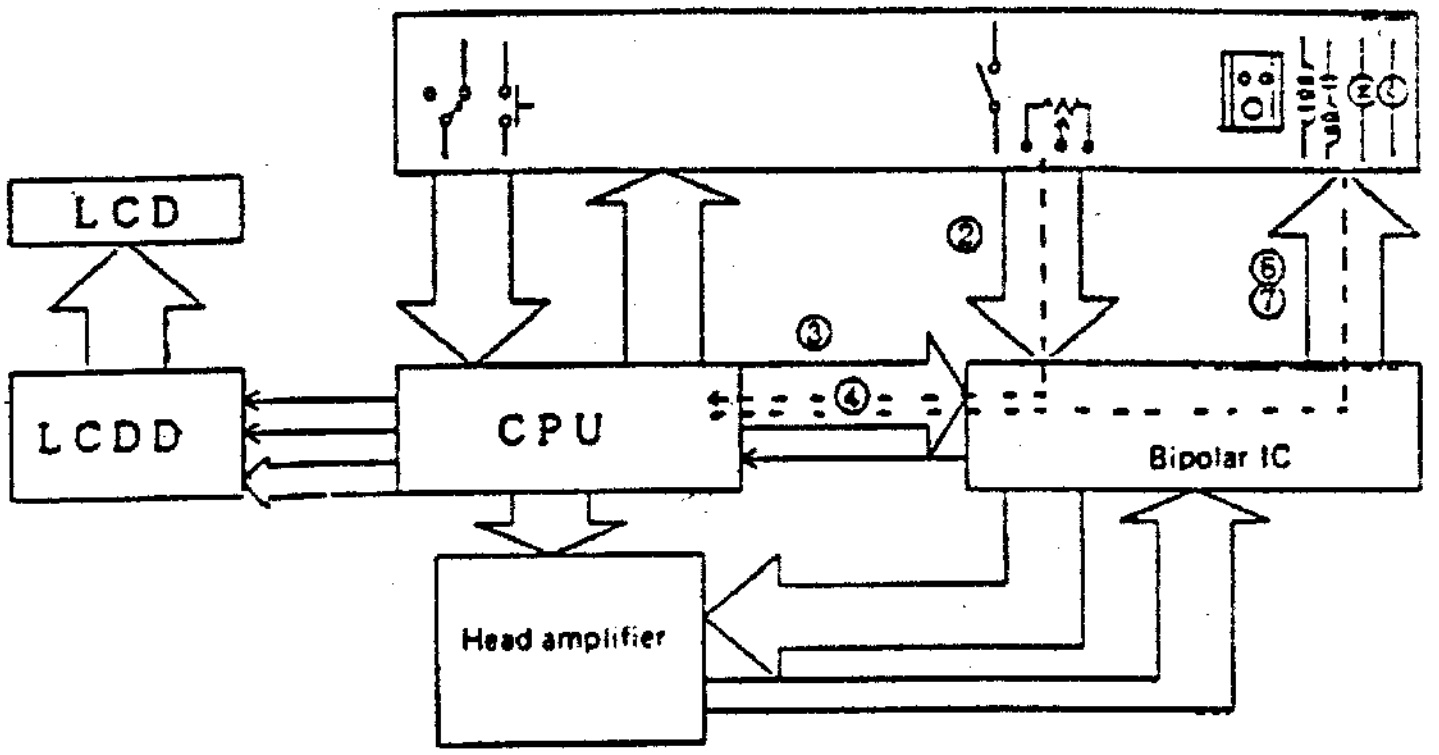
(1) CPU check for key mode:
The CPU checks for a depressed (ON) switch to mudge manual or auto mode.
The CPU emits a strobe signal to locate a depressed key (switch) and sets the camera in the mode corresponding to the depressed key (switch). This CPU starts in the set mode.

(2) CPU reads external data:
The CPU uses the bipolar IC control signal to turn ON the power supply only for the components to be used for photographing, and poses questions to the components.
Answers to the questions are returned as α to the CPU.
In this way, the CPU knows aperture value, ASA sensitivity and so on.

(3) CPU displays the results:
The CPU makes judgements based on read data, and indicates judged results on LCD and lights LEDs.

In spot auto, auto manual or memory auto mode

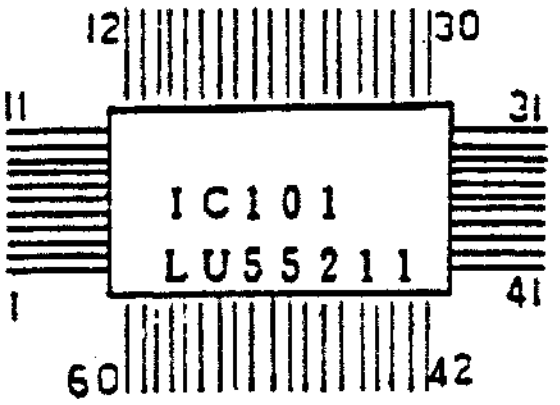
※ The regeneration time circuit of the bipolar IC is used.

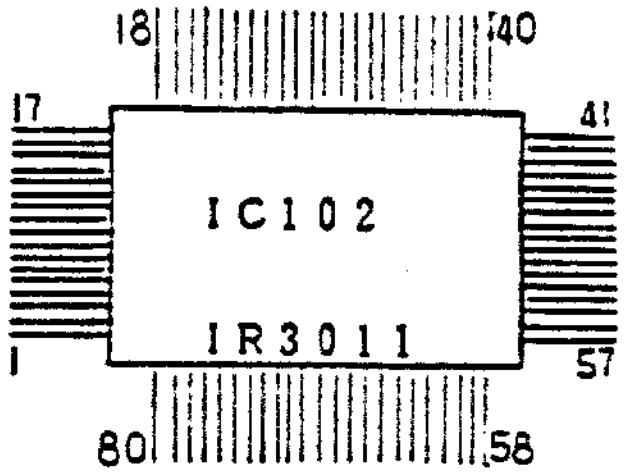


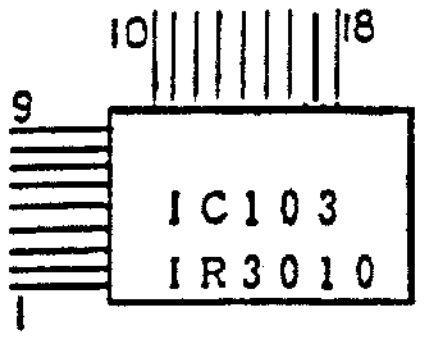
- Operating sequence
  (1) The Trg switch is turned OFF when the 1st shutter blind travels.
  (2) This switch operation is detected and an input signal is fed into the trigger adjusting circuit of the bipolar IC. (a delay time is reserved at this stage.)
  (3) The trigger adjusting circuit outputs Trg OFF signal to the CPU.
  (4) The CPU calculates the shutter time set by the Trg OFF signal.
  (5) Upon completing the calculation, the CPU inverts the M comparator.
  (6) Upon inversion of the M comparator, MG2 is deenergized and the 2nd shutter blind travels to complete the exposure.
  (7) Simultaneously, the CPU detects the completion of exposure and starts charging the capacitor for driving MG1.
  (8) After the capacitor for driving MG1 is charged up, the CPU returns to the initial program for indication.

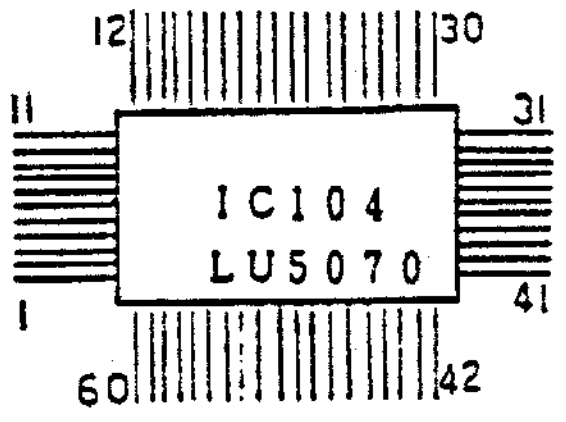
2. Description of Electric Parts

2-1. ICs









1. IC101 (LU55211)
   CPU
   Performs centralized processing of all types of data and controls the camera through the bipolar IC.

2. IC102 (IR3011)
   Bipolar IC
   Functions as an interface between external data inputs and CPU.

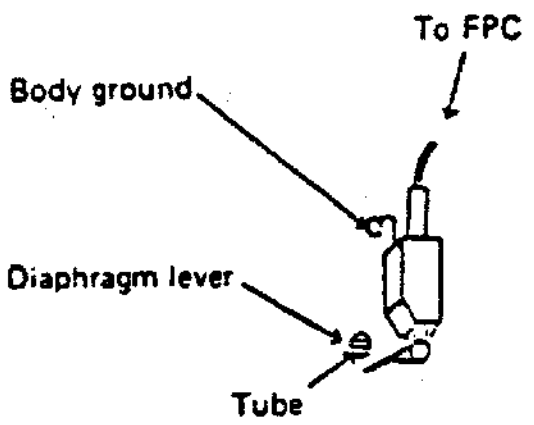
3. IC103 (IR3010)
   Head amplifier IC
   Performs light measurement in the AUTO or MANUAL mode and integration in the AUTO mode, and provides results to the bipolar IC.

4. IC104
   LCDD
   Indicates all types of data collectively on the LCD.

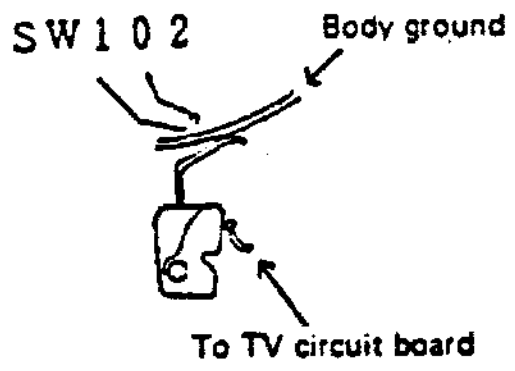
2-2. Switches

1. SW101 Main switch
   Emits an interrupt signal to the control ICs (CPU and bipolar IC) of the camera, and also serves to supply power to a part of the bipolar IC.

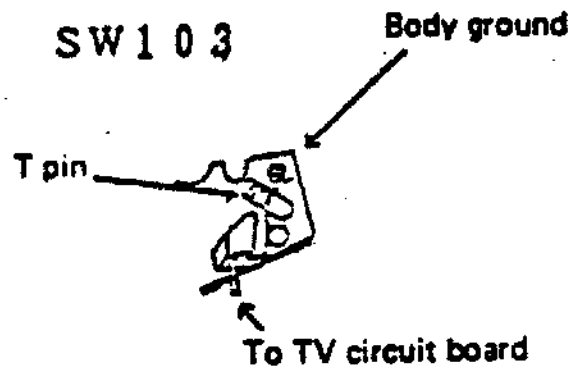
SW101



2. SW102 X switch
   For flashing the strobe.
   It is turned ON immediately after the 1st shutter blind completes travelling and the shutter is fully opened (1/60).

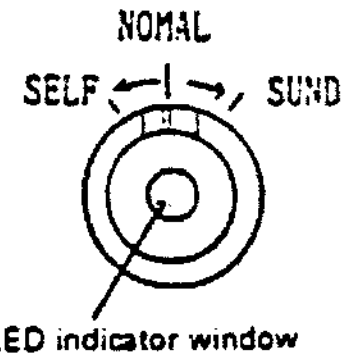


3. SW103 Trigger switch
   For starting calculation of exposure time in the AUTO or MANUAL mode.
   It is turned ON when film is wound (shutter is charged).
   It is turned OFF when the 1st shutter blind starts travelling for starting film exposure.

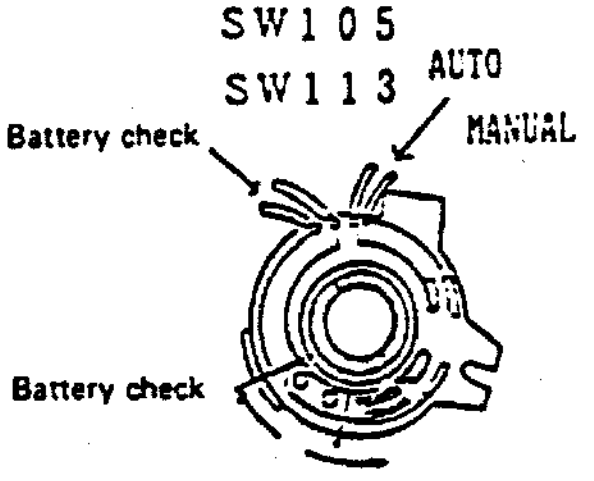


4. SW104 Self-timer switch
   When this switch is turned to the left position from the neutral position, it functions as the self-timer switch after shutter release.
   When it is turned to the right position, the PCV stops sounding.

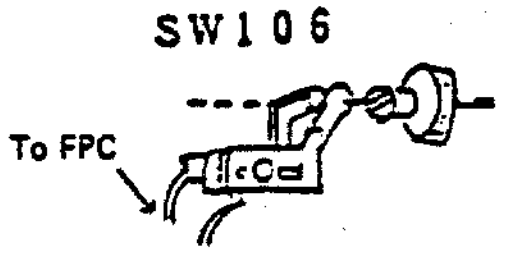
SW104



5. SW105 Battery check switch
   SW113 Mode switch
   These switches are used for setting up the battery check mode and switching between the AUTO and MANUAL modes respectively.



6. SW106 Lamp switch
   For inputting lamp ignition signal



7. SW107 SPOT switch
   For inputting spot signal.

8. SW108 HILIGHT switch
   For inputting HILIGHT CONTROL signal.

9. SW109 SHADOW switch
   For inputting SHADOW control signal.

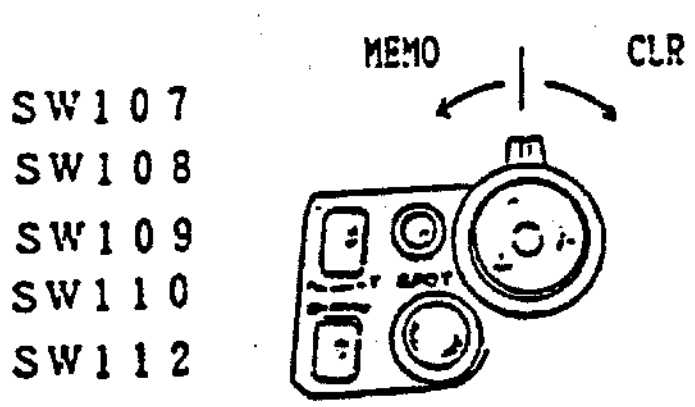
10. SW110 CLR, mount CLR switch
    For clearing the SPOT input or MEMO input which has been inputted at the stage of lens mounting or dismounting.
    (The CLR and mount CLR switch circuits are connected in series.)

11. SW111 Display switch
    For starting light measurement.

12. SW112 MEMO switch
    For inputting MEMO signal.

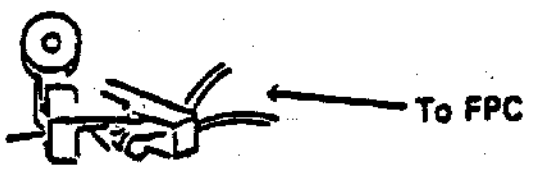
13. SW113 Mode switch
    For selecting the MANUAL or AUTO mode.

14. SW114 Reset switch
    For automatically resetting the camera in switching from the MANUAL to AUTO mode or vice versa.



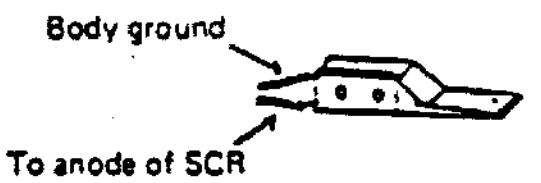
SW110 Mount CLR switch

SW111



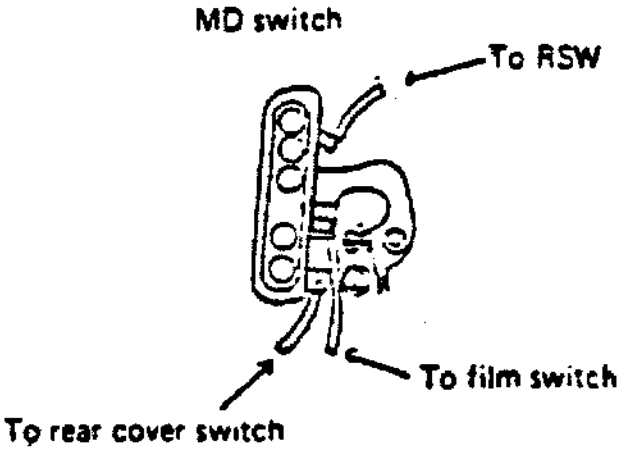
15. FP switch
    When a strobe (especially one offered by a manufacturer other than OLYMPUS) is used in combination with the synchronous socket, a high voltage is generated at the shoe input terminal during charging. This switch is turned OFF to prevent electrical shock hazard while the mirror is lowered.

FP switch



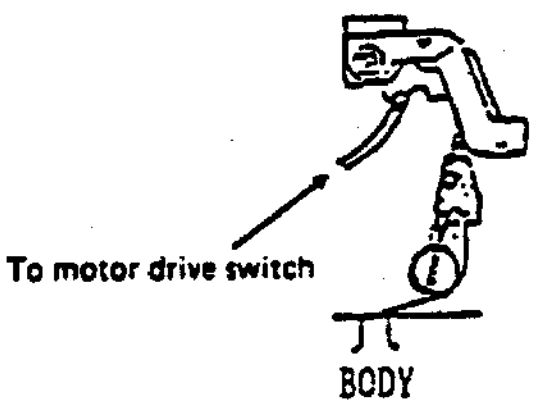
16. MD switch (Motor drive switch)
    For interlocking the motor drive or film winder with the camera.

MD switch

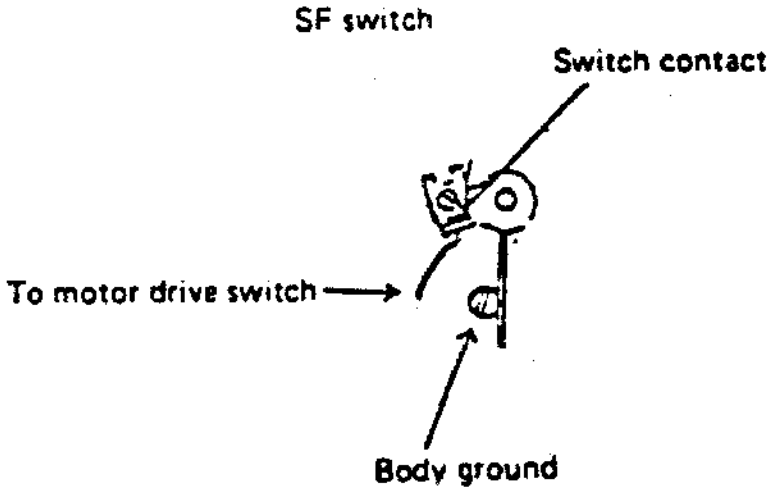


17. U switch (rear cover switch)
    Turned ON and OFF to detect conditions of the rear cover.

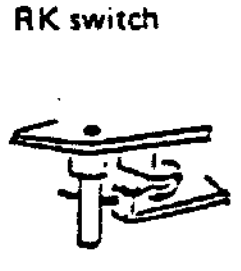
U switch



18. SF switch (film switch)
Turned ON and OFF to detect film loaded conditions.



19. RK switch
Turned ON and OFF to transmit film rewinding ready signal to the motor drive.



2-3. Transistors

1. Q101 Thyristor drive transistor
For transmitting a signal to gate of thyristor to make it conductive and flash the strobe.

2. Q102 TTL control thyristor
For TTL control of T Series strobe.

3. Q103 CPU interrupt transistor
To set the INTA terminal of the CPU at the L lever (to make an interrupt).

4. Q104 MEMO LED drive transistor
Functions as a switch for MEMO LED ON ⟷ OFF.

5. Q105 LAMP drive transistor
Functions as a switch for LAMP ON ⟷ OFF

6. Q201 MG1 drive transistor
Functions as a switch for MG1 ON ⟷ OFF.

7. Q202 MG2 drive transistor
Functions as a switch for MG2 ON ⟷ OFF.

8. Q301 LCD driver transistor
For controlling power to LCD D according to signal from the CPU.

9. Q401 BC, SELF LED drive transistor
Functions as a switch for BC, SELF LED ON ⟷ OFF.

10. Q901 Reset transistor
For discharging capacitor C901.

11. Q902 Reset transistor
For turning OFF Q903 at GO = H.

12. Q903 Reset transistor
For supplying power to LED and lamp.

13. Q904 MS transistor
For turning ON bipolar MS input.

2-4. Diodes

1. D101
For isolating the data back side from the camera side.

2. .D102 Protective diode
Protective means to prevent the batteries from setting in the reverse direction.

3. D701 Protective diode
For protecting the L terminal.

4. D901 Noise preventive diode
For preventing noise from the MS input.

5. D902 Noise preventive diode
For preventing noise from the MS input.

2-5. Resistors

1. R101 Regeneration adjusting resistor
Cooperates with RV101 for adjusting regeneration time.

2. R102 Trg adjusting resistor
Cooperates with C101 to prepare delay time for triggering.

3. R103 Iref adjusting resistor
For matching RV104 with the reference current in the data control current generator circuit of bipolar IC.

4. R104 BV adjusting resistor
Cooperates with RV105 for adjusting BV level.

5. R105 BV SPOT adjusting resistor
Cooperates with RV106 for adjusting BV spot level.

6. R106 TV/AV adjusting resistor
Cooperates with RV107 for matching DAC entry levels between TV and AV.

7. R107 Lock adjusting resistor
Cooperates with RV109 for adjusting lock voltage.
2.65V for locking and 2.90V for unlocking.

8. R108 Lock adjusting resistor
Cooperates with RV109 for adjusting lock voltage.
2.65V for locking and 2.90V for unlocking.

9. R109 Thyristor gate pull-down resistor
Cooperates with C102 to prevent thyristor from functioning erroneously due to unwanted surge noise, etc.

10. R110 Gate trigger resistor
Cooperates with C103 to turn ON thyristor.

11. R111
For reducing impedance of the negative terminal of C103 while Q101 is made non-conductive, and maintaining the terminal at sufficient potential while Q101 is made conductive.

12. R112 Current control resistor
For limiting base current of Q401.

13. R113 Current limiting resistor
For limiting base current of Q103.

14. R114 Clock resistor
For creating system clock of the CPU.

15. R115 Current limiting resistor
For limiting base current of Q106.

16. R116 current limiting resistor
For limiting base current of R105.

17. R117 Current limiting resistor
For limiting base current of Q104.

18. R118 Current limiting resistor
For limiting collector current of R104.

19. R119 Current limiting resistor
For limiting collector current of Q105.

20. R120 Current limiting resistor
For limiting collector current of Q106.

21. R121 Positive feedback resistor
For forming a positive feedback loop which prevents leak current by maintaining the same potential as that on the anode side of the head amplifier.

22. R122 Positive feedback resistor
For forming a positive feedback loop which prevents leak current by maintaining the same potential as that on the anode side of the head amplifier.

23. R123 Positive feedback resistor
For forming a positive feedback loop which prevents leak current by maintaining the same potential as that on the anode side of the head amplifier.

24. R124 Filter resistor
Cooperates with C108 to composed a low-frequency filter.

25. R125 Bias resistor for temperature compensation diode
To minimize drift from temperature of the offset circuit.

26. R126
For reducing impedance by preliminary pulling-down to prevent Q103 from operating erroneously due to noise.

27. R127
To minimize variation of impedance in the Trg 1 output.

28. R128
For compoensating insufficient output from the CV + SV operation amplifier.

29. R129
For compensating insufficient output from the DAC operation amplifier.

30. R130
To erase blinking of about 3 segments in the bar indication.

31. R132
To prevent the strobe from flashing at its maximum speed.

32. R301, R302, R303 and R304 Dividing resistors
To divide the LCD driving standard voltage for preparing bias voltage.

33. R305 TEST terminal pulling-down resistor
To reduce impedance of the TEST terminal for preventing the TEST mode from being set up by accident.

34. R306
To linearize rise waveform of ϕ LCD.

35. R307
To linearize fall waveform of ϕ LCD.

36. R401 Current limiting resistor
To limit collector current of Q401.

37. R701
To protect the L terminal.

38. R901 Current limiting resistor
To limit base current of Q901.

39. R902 Current limiting resistor
To limit collector current of Q901.

40. R903 Current limiting resistor
To limit collector current of Q902.

41. R904 Discharging resistor
For discharging C903.

42. R905 Current limiting resistor
For limiting base current of Q904.

43. R906 Current limiting resistor
For limiting base current of Q103.

44. R907 Discharging resistor
For discharging C902.

45. R133 Carry resistor
For adjusting "+" and "–" indications.

46. R201 Noise preventive resistor
For preventing noise from the MSW input.

2-6. Capacitors

1. C101 Trg adjusting capacitor
For adjusting mechanical advance or delay of the time from turning OFF the Trg switch to start of actual film exposure.

2. C102 Surge absorbing capacitor
For absorbing noise other than the ON signal.

3. C103 Gate trigger capacitor
For turning ON gate of thyristor to establish electrical continuity between its anode and cathode.

4. C104 Regeneration capacitor
For creating shutter time (1 ~ 1/2000) in regeneration manual mode.

5. C105 AUTO RESET capacitor
For resetting the CPU when the circuit is reset from the locked condition.

6. C106 Phase adjusting capacitor
Performs fine adjustment of oscillating frequency and phase adjustment.

7. C107 Phase adjusting capacitor
Performs fine adjustment of oscillation frequency and phase adjustment.

8. C108 Filter capacitor
To reduce noise to be mixed with the integral output.

9. C109 Integration capacitor
Used in combination with C110 and C111 for functioning as an integration capacitor at low ASA level.

10. C110 Integration capacitor
Used in combination with C110 and C111 for functioning as an integration capacitor at medium ASA level.

11. C111 Integration capacitor
Functions independently as an integration capacitor at high ASA level.

12. C112 phase compensation capacitor
For adjusting frequency at amplifier gain level of 0 dB.

13. C113 Bypass capacitor
To reduce noise entering the standing voltage line.
(1.8/1 V switching output)

14. C114 Bypass capacitor
For stabilizing standard voltage. Output 1.8V

15. C116 Strobe-malfunction preventive capacitor
For preventing the strobe from flashing erroneously due to bound while the M switch is turned OFF.

16. C201 MG1 capacitor
For accumulating energy required to make MG1 repulsive.

17. C202 Surge absorbing capacitor
For absorbing surge voltage in turning off MG2.

18. C203
For preventing the strobe from flashing erroneously while MG2 is deenergized.

19. C301 Boosting capacitor
For generating voltage (6 V) required to drive the LCD.

20. C302 Boosting capacitor
For generating voltage (6 V) required to drive the LCD.

21. C303 Bypass capacitor
For reducing noise entering the ϕ (clock: 32.768 kHz).

22. C401 Bypass capacitor
For reducing noise entering the HA (mode selector signal).

23. C402 Bypass capacitor
For reducing noise entering the HB (power supply bias signal).

24. C404 Bypass capacitor
For reducing noise entering the power lines related to the CPU.

25. C901 Delay capacitor
To make Q903 by reserving a delay time of 20 ms min. when the CPU reset is released.

26. C902 CPU reset capacitor
For preventing the CPU from being left in reset condition.

27. C903 Delay capacitor
For reserving time after the main switch is turned ON on the CPU until the main switch is turned ON on the bipolar IC.

2-7. Variable Resistors

1. RV101 Regeneration adjusting variable resistor
Cooperates with R101 for adjusting regeneration time.

2. RV102 Trg adjusting variable resistor
Cooperates with R102 for adjusting Trg.

3. RV103 OFFSET adjusting resistor
For adjusting offset of the main comparator.

4. RV104 Iref adjusting variable resistor
Cooperates with R103 for adjusting the standard voltage.

5. RV105 BV average adjusting variable resistor
Cooperates with R104 for adjusting BV level.

6. RV106 BV SPOT adjusting variable resistor
Cooperates with R105 for adjusting BV SPOT level.

7. RV107 TV/AV adjusting variable resistor
Cooperates with R106 for matching DAC entry levels between TV and AV

8. RV108 DAC adjusting variable resistor
For adjusting DAC to 18 V per stage (at 25°C)

9. RV109 Lock adjusting variable resistor
Cooperates with R107 for adjusting lock voltage.

10. RV110 EE adjusting variable resistor
For adjusting EE.

11. RV111 Head amplifier offset adjusting variable resistor
For adjusting offset of the head amplifier

2-8. Thyristors

- Q904 strobe flashing thyristor

2-9. LEDs

1. P101 BC SELF LED
   Functions as a mark in the BC and SELF modes.

2. P102 MEMO LED
   Functions as a mark in the MEMO and MEMO HOLD mode.

3. P103 LAMP
   Lights for 10 seconds for illuminating the LCD.

2-10. Control Magnets

1. RY101 MG1
   The releasing claw is disengaged by repulsive force of a combination of magnets.
   MG1 is energized for unlocking the shutter.

2. RY102 MG2
   Controls the end shutter blind to determine exposure time.

2-11. Connectors

1. J101 Rubber connector
   For transmitting output signal from LCD, D to the LCD.

2. J102 Hot shoe
   For connecting the strobe to the camera and signal line.

3. J103 5-pin connector
   For connecting the strobe to the camera and signal line.

2-12. Crystal Oscillator

- DZ101
  Functions as a standard clock for ϕ LCD for the LCDD, PCV and regeneration time.

2-13. LCD

- LD101 Liquid crystal display
  For displaying data processed by the CPU.

2-14. PCV

- SP101 (PCV)
  Sounds for warning.

3. Description of Electric Circuits

3-1. CPU (IC101)

LU55211 is combined with the bipolar IC (IR3011) and LCD driver (LH5070) to compose CMOS LSI for controlling the mechanisms of the camera, LCD and other indicators.
Features of the camera using LU55211 are described below:

1. Photographing modes
   Average direct mode
   Manual mode
   Spot mode (average, high light control and shadow control)
   Strobe mode
   Memory mode

2. Display items on LCD
   Shutter time (OVER, 1/2000 ~ 1 S)
   Light measurement level (+5 EV ~ −61/3 EV manual mode)

3. Indicator LEDs
   Battery check LED
   Strobe LED
   Lamp LED
   Memory LED

4. PCV output
   Key input time
   Self-timer actuation time
   Battery check time
   Shutter time too long in auto mode

1. Mode Switching and Key Inputs

1. Mode switching
   MANUAL:
   The camera is set in the manual mode when the mode switch is set at MANUAL.
   AUTO:
   The camera is set in the auto mode when the mode switch is set at AUTO.

2. SLEF switch
   (1) When the main switch is turned ON with the SELF switch set at ON preliminarily, the self-timer actuates and then the camera is set in a photographing mode. — Self time 12 sec. (except when the camera is set in the BU mode or the shutter is set for mechanical time of 1/60 sec.).

(2) When the SELF switch is turned ON during operation of the slef-timer, the camera is set in the photographing mode immediately.

3. BAT switch
   (1) When the BAT switch is turned ON, the camera is set in the battery check mode and power supply voltage is compared with the standard voltage.
   (2) The battery check mode is cancelled by turning OFF the BAT switch.

4. LAMP key
   (1) This key is effective in the AUTO and MANUAL modes (except when the camera is set in the BY mode or the shutter is set for mechanical time of 1/60 sec.).
   When this key is depressed, the LAMP LED stays lit for 10 seconds.
   (2) The LAMP key is effective every other time it is depressed.

5. SPOT key
   (1) This key is effective in the AUTO, MANUAL and SPOT modes. It is used for entering SPOT input. When it is depressed in the average direct light measurement mode, the camera is set in the SPOT mode.
   (2) 8 SPOT inputs max. can be stored at a time. New data can be entered by discarding the old inputs.
   (3) The SPOT key is effective in both AUTO and MANUAL average light measurement modes. Upon depressing the key, the camera is set for spot light measurement mode.

6. HILIGHT key
   (1) This key is effective in the AUTO and MANUAL SPOT modes.
      o When the key is depressed in the average spot or shadow control mode, the camera is set in the HILIGHT CONTROL mode.
      o When the key is depressed in the HILIGHT CONTROL mode, the camera is set in the SPOT AVERAGE mode.

7. SHADOW key
   (1) This key is effective in the AUTO and MANUAL SPOT modes.
      o When the key is depressed in the AVERAGE SPOT or HILIGHT CONTROL mode, the camera is set in the SHADOW CONTROL mode.
      o When the key is depressed in the SHADOW CONTROL mode the camera is set in the SPOT AVERAGE mode.

8. MEMO key
   (1) This key is effective in the AUTO AVERAGE DIRECT light measurement mode and SPOT mode. When the key is depressed in either of these mode, the camera is set in the MEMO mode.
   (2) The MEMO key is ineffective once the memory is set.

9. CLEAR key
   (1) This key is effective in the AUTO and MANUAL modes (except when the camera is set in the BU mode or strobe mode). When the key is depressed, the bar and spot inciations are erased, and the camera is set in the AVERAGE DIRECT light measurement mode.
      o In the AUTO mode, SPOT, MEMO and MEMO HOLD settings are cleared.
      o In the MANUAL mode, SPOT setting is cleared and the camera is set in the AVERAGE MANUAL mode.

10. DISP key
   (1) This key is effective for starting indications on the LCD in each of the AUTO and MANUAL modes.
   (2) When the LCD has already started indication, display time (2 min.) is updated by depressing the DISP key.

2. LCD

1. Display function

(1) The LCD displays light measurement and memory regeneration in the AUTO and MANUAL modes as well as OVER and UNDER in the STROBE mode.

- Start of display
  (1) When the mode switch is turned to AUTO or MANUAL.
  (2) In the AUTO or MANUAL mode:
    - When the STROBE signal is turned ON or OFF.
    - When photographing operation complates.
    - When a valid key input (CLEAR, SPOT, HILIGHT, SHADOW or MEMO) is received (the LCD restarts when it receives a new input during display.)
    - When the DISP key is depressed (1st stage of the release button).

- Display time
  (1) Light measurement and memory regeneration are displayed for 2 minutes.
  (2) When the LCD receives a new input during display, it restarts display for another 2 minutes.

- Stop of display
  (1) When 2 minutes lapses after start of display.
  (2) When the camera is set in the BU mode.
  (3) When the shutter is set for mechanical 1/60 sec.

  Note: When the LCD display is stopped in the SPOT or MEMO mode, the mode setting is cleared automatically

2. Display patterns

(1) " ϟ " mark
This mark is displayed when the STROBO signal is turned ON and erased when the signal is turned OFF in any mode.

(2) "+" mark
This mark flickers during exposure correction in the AUTO or MANUAL mode.

(3) "MEMO" mark
This mark is displayed in the memory set condition and flickers in the memory hold condition in the AUTO mode.

(4) "SPOT" mark
This mark is displayed in the SPOT mode (SPOT AUTO, SPOT MEMORY AUTO or SPOT MANUAL) of the AUTO or MANUAL mode.

(5) "HILIGHT" mark
This mark is displayed in the HILIGHT CONTROL condition when the camera is set in the SPOT mode of the AUTO or MANUAL mode.

(6) "SHADOW" mark
This mark is displayed in the SHADOW CONTROL condition while the camera is set in the SPOT mode of the AUTO or MANUAL mode.

(7) "UNDER" mark
This mark flickers for 2 seconds after completing photographing operation if exposure is insufficient in photographing in the STROBE mode of the AUTT mode.

(8) "OVER" mark
This mark flickers for 2 seconds after completing photographing operation if exposure is excessive in (1) STROBE mode of the AUTO mode.

(9) "OVER" mark
This mark flickers when shutter speed (indicated on the bargraph) exceeds 1/2000 sec. in the AUTO mode.

(10) " ▶◀ " mark (at the lower stage)
This mark is displayed to indicate shutter time of the auto strobe (1/60 sec.) when the strobe power supply is turned ON in the AUTO mode.

(11) Index "+ II ▶I◀ II −"
This mark is displayed in each of the AUTO modes.

- Shutter time lamps "2000, 1000, 500, 250, 125, 60, 30, 15, 8, 4, 2, 1"
  (1) All the lamps light in the AUTO mode.
  (2) Only one lamp corresponding to the selected TV value lights in the MANUAL mode.

Bargraph

(1) Shutter time is displayed on a bargraph in the AUTO mode.
Shutter time of 1 to 1/2000 sec. is displayed in 1/3 EV steps.
- ○ In the AVERAGE DIRECT AUTO mode, shutter time is calculated from light measurement value (BV), ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.
- ○ In the MEMO AUTO mode, shutter time is calculated from MEMO set value, ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.

(2) In the MANUAL mode, exposure level for the set shutter time (TV) is indicated by the bar. −6 1/3 EV to +5 EV is indicated in 1/3 EV steps.
- ○ In the AVERAGE MANUAL mode, exposure level is calculated from light measurement value (BV), shutter time (TV), ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.
- ○ In the SPOT MANUAL mode, exposure level is calculated from spot light measurement value (BV), shutter time (TV), ASA value (SV), corrected value (CV) and aperture value (AV), and indicated by the bar.

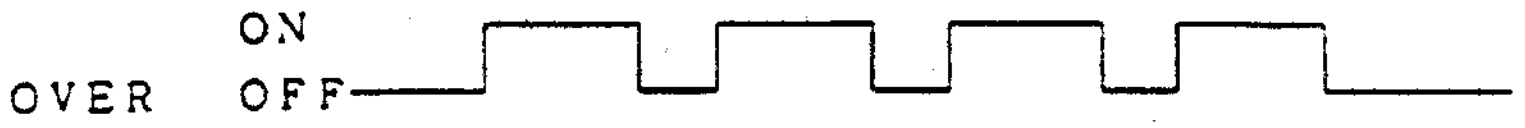
(3) Light measurement value and calculated spot value are indicated by tip of the bar.

(4) In the SPOT mode, maximum or minimum brightness point is displayed and then the predetermined value is indicated when maximum brightness in the HI-LIGHT CONTROL mode or minimum brightness in the SHADOW CONTROL mode is newly inputted for recalculation (when the camera is newly set in the HILIGHT CONTROL or SHADOW CONTROL mode, or when maximum or minimum brightness varied by overflowing spot input).

- Spot secanning point

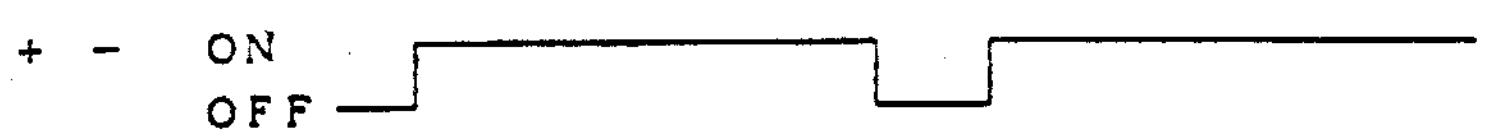
(1) Spot scanning point is indicated in the SPOT mode of the AUTO or MANUAL mode.
- ○ In the AUTO mode, spot input value, spot light measurement value of object to be photographed (BV), ASA value (SV), and aperture value (AV) are calculated to indicate shutter time to be used as standard exposure level.
(Indication in the same 1/3 EV steps as those for bar indication.)
- ○ In the MANUAL mode, spot input value, spot light measurement value of object to be photographed (BV), ASA value (SV), aperture value (AV) and shutter speed (TV) are calculated to indicate exposure level by the dot.
(Indication in the same 1/3 EV steps as those for the bar indication.)
- ○ For shifting all the indications due to variations of AV, SV and TV during multi-point indication, spot input value is shifted directly to a new point.
- ○ The dot indicating spot light measurement value of brightness of object to be photographed is shifted while lighting the intermediate segments in the same manner as that for the bar indication.

- Flickering cycle
  The segments for flickering indication are switched in the cycles shown below:
  (1) Over-exposure in the AUTO mode.

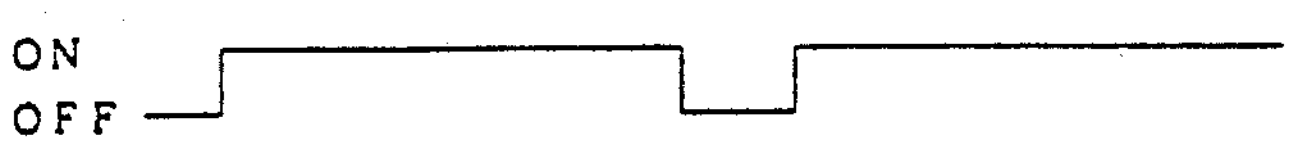


(2) UNDER/OVER indication in strobe mode

(3) Exposure correction



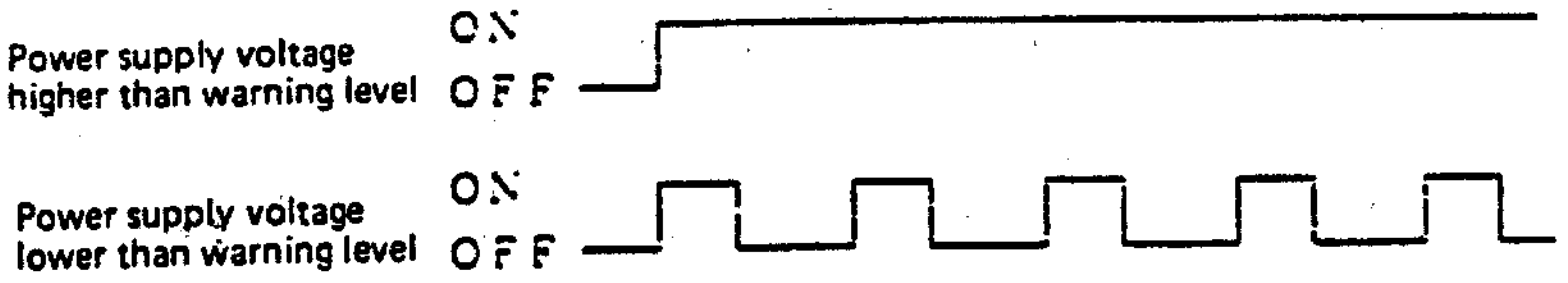
(4) Memory hold



Note: Indication remains unchanged for a period of time after the main switch is turned ON till lapse of 100 ms after completion of integration. For this time, the memory hold lamp stays lit and UNDER/OVER lamp goes out if the OVER+ and −MEMO lamps are flickering.

3. LED indications

1. SELF and B. check LEDs
   (1) The B. check LED flickers when power supply voltage is lower than the warning voltage level in the B. CHECK mode.

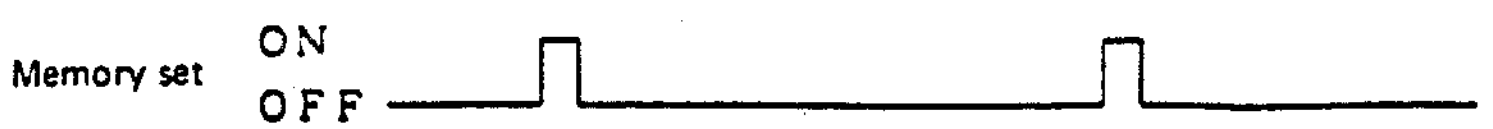


(2) The SELF LED flickers during operation of the self-timer.

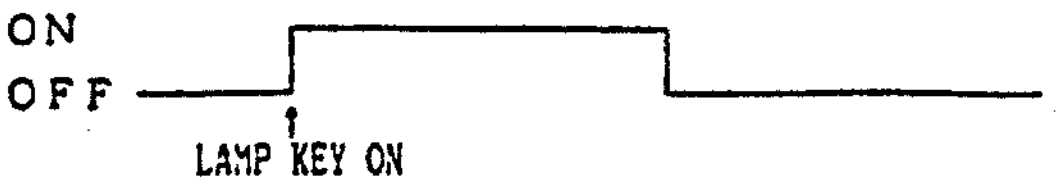
2. Strobe LED
   (1) The strobe LED lights upon completion of strobe charging (CHARGE signal at L level) while "⚡" marks is indicated on the LED (STROBE signal at H level) in all the modes.
   (2) The strobe LED goes out 2 sec. after completing photographing in the strobe mode. It flickers when light control is proper after flashing in the AUTO mode.

3. MEMO LED
   (1) The MEMO LED flickers in the memory set condition in the AUTO mode.

   (2) The MEMO LED flickers in the memory hold condition in the AUTO mode.



4. LAMP LED (indicator illuminator LED)
   This LED stays lit for 10 seconds when the LAMP key is depressed during LCD indication in the AUTO or MANUAL mode. The LAMP key is inoperative while the LAMP LED stays lit. When the LCD indication stops in lit condition of the LAMP LED, it is also extinguished.



When the main switch is turned ON while the LAMP LED stays lit, it is extinguished and kept so even after completion of photographing.

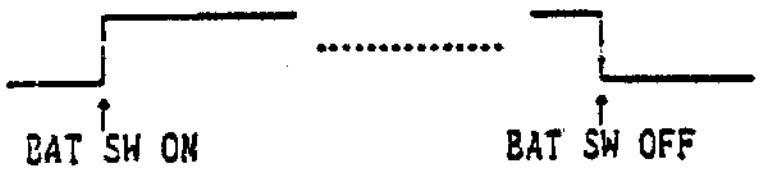
4. PCV Output

1. Key input (valid)
   The PCV sounds when CLEAR, SPOT, HILIGHT, SHADOW, MEMO or key input is entered.

2. Self-timer actuation time

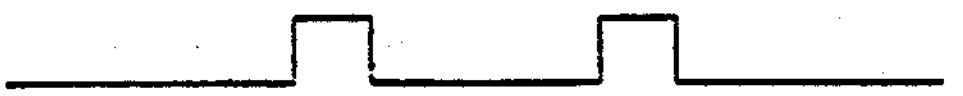
3. Battery check time

(1) Battery voltage higher than warning level



(2) Battery voltage lower than warning level

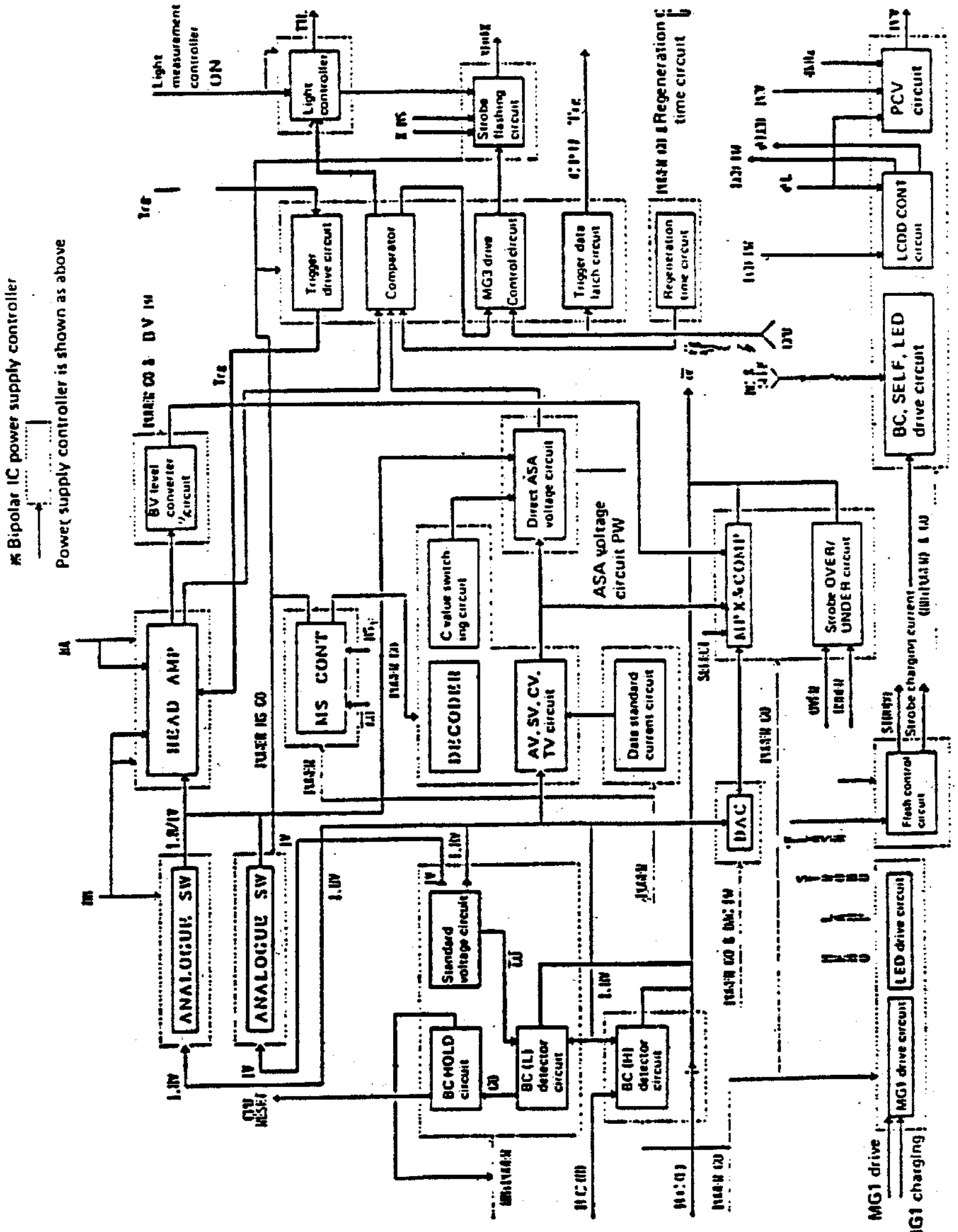
4. Shutter time too long in AUTO mode



3-2. Bipolar IC

The bipolar IC consists of the blocks shown below:

- Block diagram



- Description of bipolar IC circuit

1. BC (H) detector circuit
   The power supply voltage is judged in three stages.
   (1) At Vcc > 2.75V, the PCV sounds intermittently and LED stays lit.
   (2) At 2.75V ≥ Vcc > 2.65V, the PCV sounds intermittently and LED flickers.
   (3) At Vcc ≤ 2.65V, the PCV stops sounding and LED is entinguished.
   The BC (H) circuit judges whether Vcc is higher or lower than 2.75V.
   According to command from the CPU, the judgement result is outputted to α (terminal No. 38) and processed by the CPU.
   According to the processing result, the CPU judges whether battery OK or warning is to be indicated.

2. BC (L) detector circuit
   This circuit operates quite independently from the CPU for judging whether power supply voltage is higher or lower than 2.65V. When power supply voltage is lower than 2.65V, it forcibly turns OFF all the indicators other than those within the viewfinder, stops power from combination magnet MG1 and locks the shutter to prevent the camera from abnormal operation or indication regardless of the low CPU voltage.

3. BC HOLD circuit
   Even when power supply voltage becomes lower than 2.65V at a low temperature, battery voltage is gradually restored to the required level as temperature rises. The BC HOLD circuit is a power supply voltage judging circuit which applies reset pulse to the CPU and has a hytersis width for restarting operations when battery voltage is restored to 2.90V or higher after it becomes lower than 2.65V to stop all the functions of the circuits. Restoration voltage is set at approx. 2.90V.

4. Standard voltage generator circuit
   This circuit generates two voltages of 1.8V and 1V. Battery check is performed by comparing power supply voltage with these voltages.

5. Decorder
   This circuit decodes digital signals transmitted from the CPU and generates control signals for each block.

6. AV, SV, CV, TV circuit
   This circuit generates analog outputs as aperture data AV, ASA data SV, exposure correction data CV and manual time data TV.

7. C value switching circuit
   Since Model OM-4 has a wide dynamic range of ASA 6 to 3200, integral voltage judgement level in the direct light measurement mode is too high for the ordinary method and impossible with a power supply of 3V.
   Therefore, direct light measurement capacitors and judgement levels are simultaneously switched at three stages of low ASA, medium ASA and high ASA. The wide dynamic range and high ASA judgment level makes Model OM-4 highly resistant to noise.
   The C value switching circuit selects judgment levels and integrating capacitors according to commands emitted from the CPU depending on SV values read into the CPU.

8. DAC
   This is a D/A converter circuit composed of 8 bits in an irregular format.
   Generated at the output stage of the DAC are analog voltages corresponding to levels in the 8 input bits connected to the output ports of the CPU. Analog data such as SV and CV are compared with the DAC output voltages by a comparator described later for converting the analog values into digital signals.

9. MPX & COMP
   This system performs A/D conversion by consecutive comparison.
   Data to be subjected to the A/D conversion are SV, CV, TV, AV and BV. However, these data cannot be converted simultaneously, and subjected to A/D conversion on a time base as commanded by the CPU.
   MPX & COMP selects one of these analog data as commanded by the CPU, and compares it with the DAC output by a comparator.
   A comparator is provided for each type of analog data.

10. Data standard voltage circuit
Each analog data generator circuit basically consists of a standard current flowing through data resistors and proportional to absolute temperature.
This circuit generates the standard current described above.

11. Direct ASA voltage circuit
This circuit judges level of integral voltage in the direct light measurement mode.
It switches levels irregularly depending on CV value.

12. BV level converter circuit
Data on brightness of object to be photographed is converted into an analog voltage by the head amplifier. However, the head amplifier. However, the head amplifier output cannot be subjected directly to A/D conversion, and it is necessary to shift level about 300mV.
Further, the spot receiving area is narrower than the average area. It is therefore necessary to compensate the difference between the average BV spot and spot BV of the head amplifier output even when brightness of objects to be photographed are on the similar level. The BV level converter circuit has such a compensating function.

13. Trg adjusting circuit
This circuit consists of CR and compartor, and performs trigger adjustment with variable resistors.

14. Compartor
This circuit compares integral voltage with judgment standard voltage in the direct and manual light measurement modes.

15. MG2 drive control circuit
MG2 is controlled not only by the comparator described in item 14 above but by the high-speed limiter signal outputted from the CPU and trigger data latch circuit described later. The controls must be performed differently in the individual modes.
This circuit composes the high-speed limiter signal, output from the trigger data latch circuit and compartor output for driving MG2.

16. Trg data latch circuit
This circuit transmits pulses indicating exposure time to the CPU.

17. Regeneration time circuit
This circuit creates manual time.

18. Strobe flashing circuit
The strobe is flashed at full speed in the manual mode and only at 1/60 or lower speed in the auto mode.
This circuit determined whether or not the strobe is to be flashed, and generates gate signal for triggering SCR when the strobe is to be flashed.

19. Light control circuit
This circuit generates TTL control signal.

20. Flash control circuit
The strobe TTL control is performed when the power supply is turned ON for the strobe designed for use with Model OM-4.
Further, the LED lights in the viewfinder when the strobe is charged up.
These controls are performed by discriminating levels of the current flowing from the strobe to the L terminals and judging the signal from the discriminator circuit by the CPU. The flash control circuit detects current levels on the two terminals.

21. Strobe OVER/UNDER circuit
Strobe OVER is judged when judgment level is 1 EV higher than the correct level, whereas strobe UNDER is judged when judgment level is 0.6 EV lower than the correct level.
The strobe OVER, UNDER circuit compares integral of direct light measurement value with the correct level.

22. MG1 drive circuit
This circuit consists of a circuit for the capacitor for driving combination magnet MG1 with a constant current and another circuit for discharging electric charges accumulated in this capacitor to MG1 in a moment.

23. LED drive circuit
This circuit prevents the LEDs from lighting erroneously when power supply voltage becomes lower than the lock level.

24. BC, SELF LED drive circuit
This circuit drives the LED serving both for the battery check and self-timer actuation.

25. LCD control circuit
This is a gate circuit which prevent the LCD from providing erroneous indications due to malfunction of the CPU when power supply voltage becomes lower than the lock level. If forcibly turns OFF the LCD when power supply voltage is lower than the lock level.

26. PCV circuit
This circuit controls sounding of the PCV. It prepares PCV sounding frequency of 2 kHz and 4 kHz by dividing chiefly 32.768 kHz.

27. Analog switch
Used for switching the standard voltage between 1.8V and 1V.

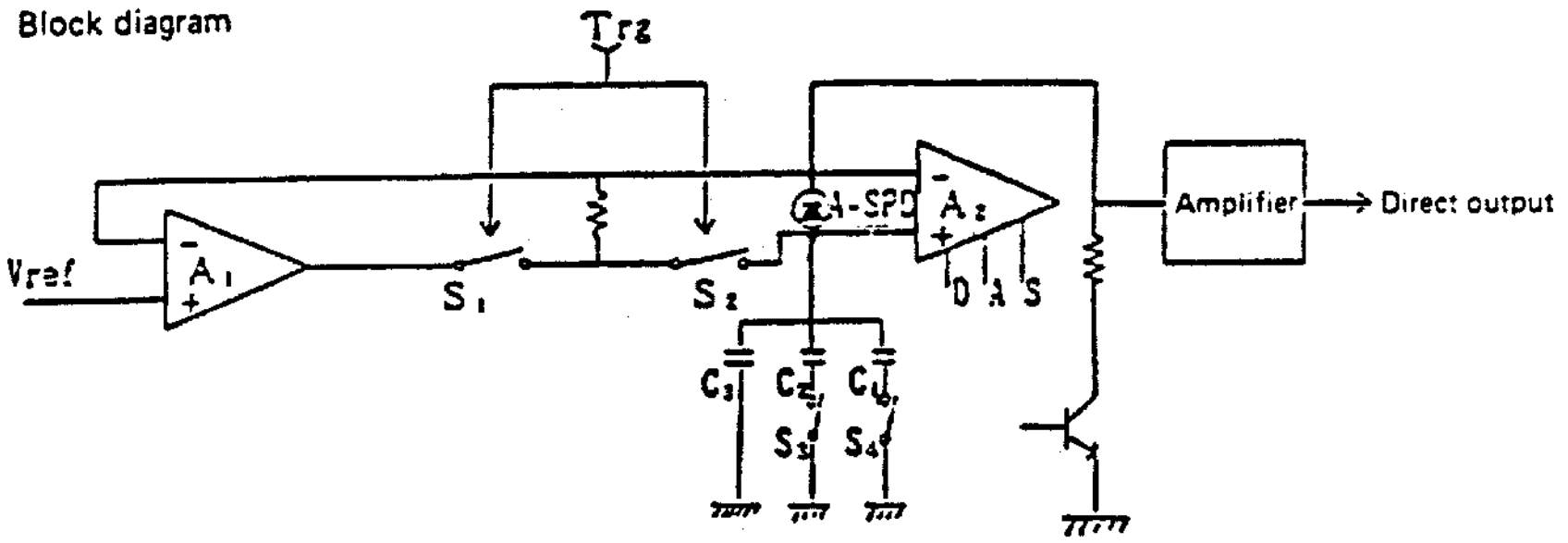
28. MS CONT circuit
This circuit controls power supply for each block when the main switch is turned ON.

3-3. Head Amplifier IC

The head amplifier functions as an integration circuit in the direct light measurement mode.
It generates compression voltage (average BV) and compression voltage of spot brightness (spot BV) during indication and light measurement.

- Circuit for direct light measurement

- Block diagram



- Description of block diagram

Ulike the integration system of Model OM-2, integration system of Model OM-4 amplifies input capacitor charging voltage of the OP amplifier to operate the comparator of the biopolar IC.
C_1, C_2 and C_3 are integrating capacitors which are used selectively depending on ASA level since Model OM-4 has a wjde dynamic range of ASA6 to 3200.

(1) When film is wound and shutter is released at the initial stage, the main switch, S_1 and S_2 are turned ON.

(2) When S_1 and S_2 are turned ON, A_1 is actuated and its output Vref (standard voltage of 1V) is applied to "+" of A_2. Simultaneously, the capacitors (combination of C_1, C_2 and/or C_3) are charged.
Depending on ASA value, C_1, C_2 and/or C_3 are made conductive and grounded by a certain combination determined by command from the CPU. (Only the grounded capacitors are charged.)

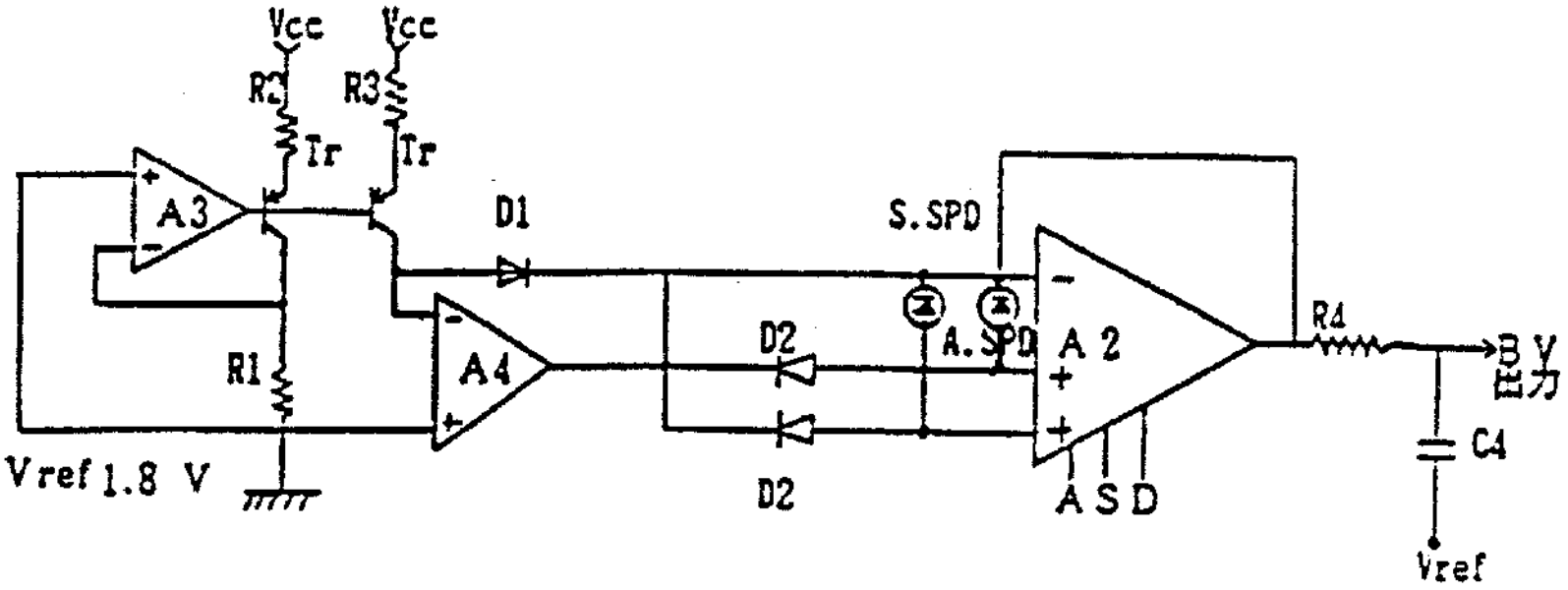
(3) When the 1st shutter blind travels and Trg is turned ON integration is started.
When Trg is turned OFF, S_1 and S_2 are turned OFF, and the capacitors are chaged with photocurrent from the SPD.

(4) The charging voltage is detected by A_2 and outputted to the amplifier arranged at the next stage.

(5) The amplified integral voltage is fed into the comparator of the bipolar IC and compared with the ASA judgment voltage.

(6) When the correct exposure level is reached, the comparator of the bipolar IC is inverted, the magnet is deenergized, the 2nd shutter blind starts and the shutter is closed to complete the photographing operation.

- Circuit for indication and light measurement (average light measurement and spot light measurement)
- Block diagram



- Description of block diagram

This block diagram shows the object brightness detector circuit for indication within the viewfinder (corresponding to CdS of Model OM-2). Light is measured in the average mode or spot mode for indication. Brightness measured in the average mode is indicated for photographing in the direct mode, whereas brightness measured in the spot mode is indicated for photographing in the spot measurement exposure mode.

In the spot measurement exposure mode, film is exposed for the time set with the SPOT switch.

According to mode selection, A_2 is set for direct light measurement, spot light measurement or average light measurement, and the SPD is selected by a command from the CPU.

Though photoelectromotive force of the SPD reaches scores of thousand as high at high brightness, such large variation of SPD output is reduced to a low level, detected by A_2 and fed into the bipolar IC.

(1) A constant current determined by R1 and standard voltage Vref (1.8V) flows to R3.

(2) The constant current flowing through R3 circulates to temperature compensating diode D1.
Since D1 composes a negative feedback circuit, potential is equal at the "+" input and "—" input terminals of A4.
Therefore, A4 provides an output voltage equal to voltage drop of Vref — D1.

(3) Connected to the input stage of A2 are SPOT SPD and average light measurement SPD.
Either of the SPDs is used according to select signal A, S or D for A2.

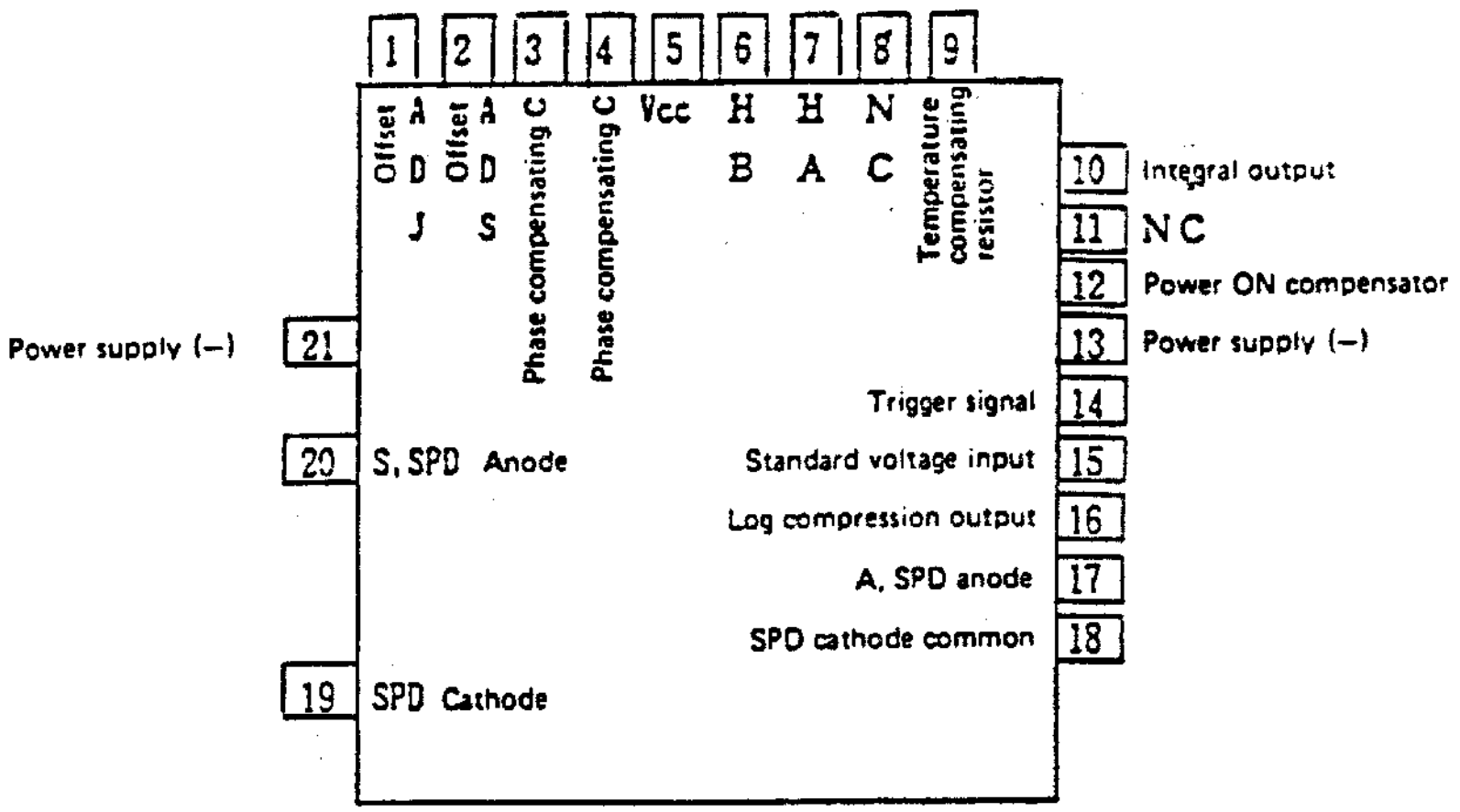
(4) Let us now assume that the average light measurement SPD is selected. The photocurrent flowing through this SPD circulates through the compression diode D2 into the output stage of A4.
D2 is used for converting the photocurrent varying at a ratio of 1/scores of thousand into a voltage having a low variation ratio.

(5) A2 is a buffer amplifier having a gain level of 1, and potential is the same between the "+" and "—" terminals at the output stage.

(6) The input voltage to the "—" terminal of A2 is equal to voltage drop Vref — D1, whereas input voltage to "+" terminal is equal to voltage drop Vref — D1 + voltage drop due to photocurrent from D2.
Therefore, A2 detects voltage drop sue to the photocurrent from D2 and provides BV output. SPD output is obtained in this way.

(7) D2 is a silicon diode having a certain temperature coefficient which is cancelled by connecting D1 and D2 to each other. For this reason, D1 is called "temperature compensating diode.

- Functions of IO ports of head amplifier



- Functions of main terminals

(1) Log compression output No. 16
BV output terminal. Connected to BVIN of the bipolar IC through a filter for absorbing noise.

(2) Power ON compensation No. 12
Limiter connected to the limiter output terminal No. 1 of the bipolar IC.

(3) Integral output No. 10
Integral output terminal for direct light measurement. Provides integral output taking Vref (1.8/1 V) as standard after Trg 1 is turned from L of H.

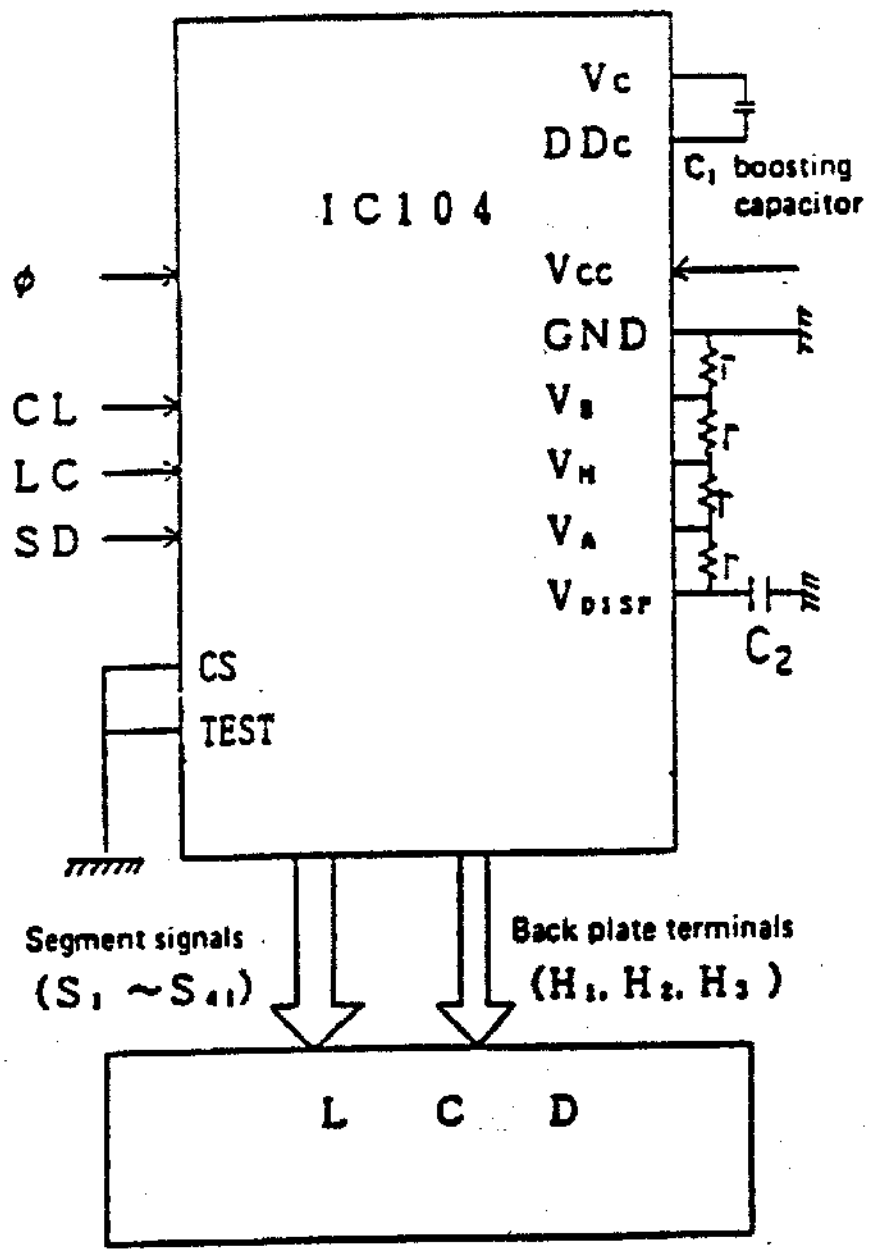
(4) Temerature compensating resistor No. 9
8V termperature compensating resistor. 8V output is enhanced when this resistor has higher value, and vice versa.

(5) Phase compensating capacitors No. 3 and No. 4
Adopted for preventing outputs Nos. 10, 16 and 18 from oscillating.

3-4. LCD Driver

IC104 is a liquid crystal cell driving element manufactured by CMOS silicon gate process. It prepares an indication voltage twice as high as the power supply voltage by an internal booster, and drives the liquid crystal cell at 1/3 bias and 1/3 duty. It is equipped with 3 back plate terminals and 41 segment terminals, and capable of driving 123 segments max.

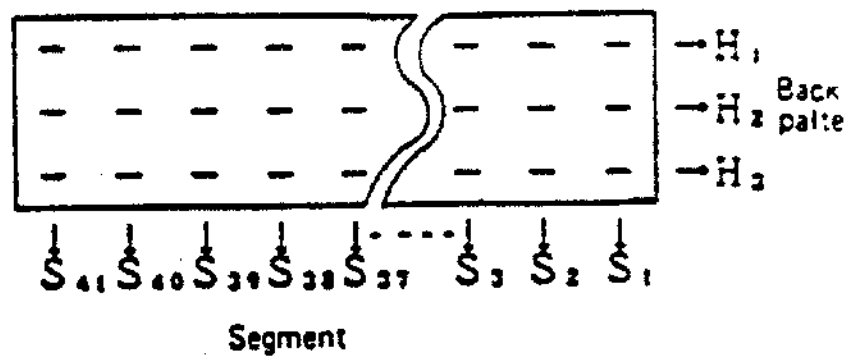
○ System configuration



○ Description of system

(1) Data transfer to IC104 is performed with serial transfer clock (CL), synchronous signal (LC) and serial data (SD).
(2) At LC = 0, the IC is set in standby condition.
(3) At LC = 1, data are entered upon reception of clock CL.
(4) Voltage is increased to 6V by the boosting capacitor, etc.
(5) The standard voltage for driving the LCD is prepared by dividing the boosted voltage by resistor r.
(6) Arranged in IC104 is a RAM for storing segment and back plate indication data.
(7) 1 bit of the RAM corresponds to 1 segment on the LCD.
(8) Addresses and data are set in the RAM by external serial data.
(9) The address is increased automatically by setting data into the RAM.

○ LCD display



The LCD display has segments in 41 horizontal rows and back plates in 3 vertical rows. Voltages at three stages of 2, 4 and 6V obtained by dividing the boosted voltage are inputted into the segments and back plates.

○ Ignition of LCD display

(1) A voltage of 2, 4 or 6V is inputted to a horizontal segment to be ignited and a vertical back plate respectively.
(2) Voltage is inputted so as to produce a voltage difference of at least 4V between the vertical and horizontal directions.
(3) Segments having voltage difference of at least 4V between the vertical and horizontal directions are ignited. When 2V is inputted to a horizontal segment and 6V is inputted to a vertical back plate, for example, the segment is ignited. When 2V and 4V are inputted, however, the segment is not ignited.

Segment igniting sequence

(1) The CPU selects a segment to be ignited depending on conditions for operating the camera.
(2) A combination of vertical and horizontal voltages is calculated to ignite the segment of interest.

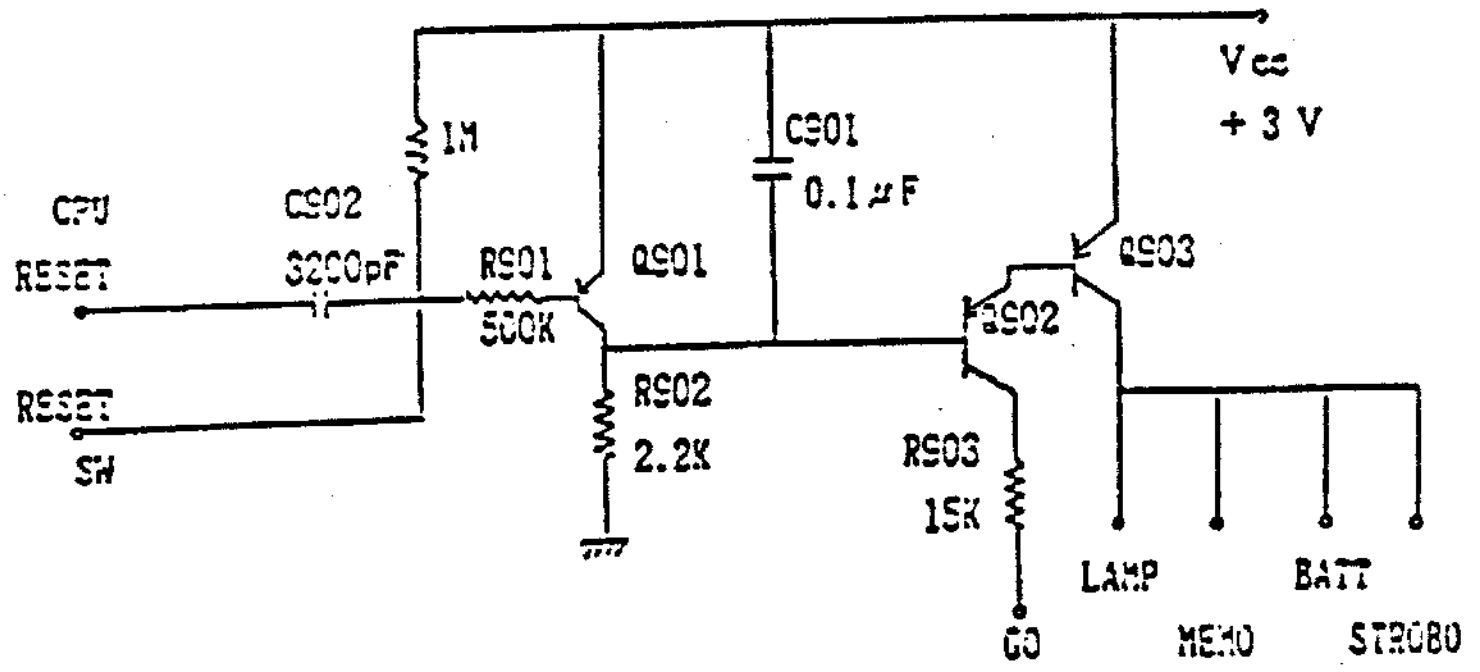
(3) The address of the segment to be ignited, voltage for the vertical back plate and voltage for the horizontal segment are transmitted as serial data from the CPU to IC104 LCD driver.

(4) IC104 LCD driver stores the data in its internal RAM.

(5) Simultaneously, segment of the LCD display is selected and ignited.

3-5. RS Circuit Board

o **Reset circuit**



• Description of cirucit

- This circuit is adopted for preventing the circuits from becoming inoperative when the CPU is set in ACL condition where all the LEDs and lamps are lit, current consumption increases and the mirror lock is actuated.
- While the CPU is reset or for 30 ms after the CPU is released from the reset condition, the LEDs (LAMP, MEMO, BATT and STROBE) are deenergized.
- C902 is a reset pulse width limiter and C901 is used for deenergizing the LEDs by reserving a delay time of at least 30 ms.

(1) When the CPU is reset, Q901 is made conductive for the time required to charge C902, Q902 is made non-conductive, Q903 is made non-conductive, the LAMP, MEMO and other LEDs are extinguished.

(2) Upon completing charging of C902, the reset pulse is switched from L to H level. Q901 is made non-conductive accordingly.

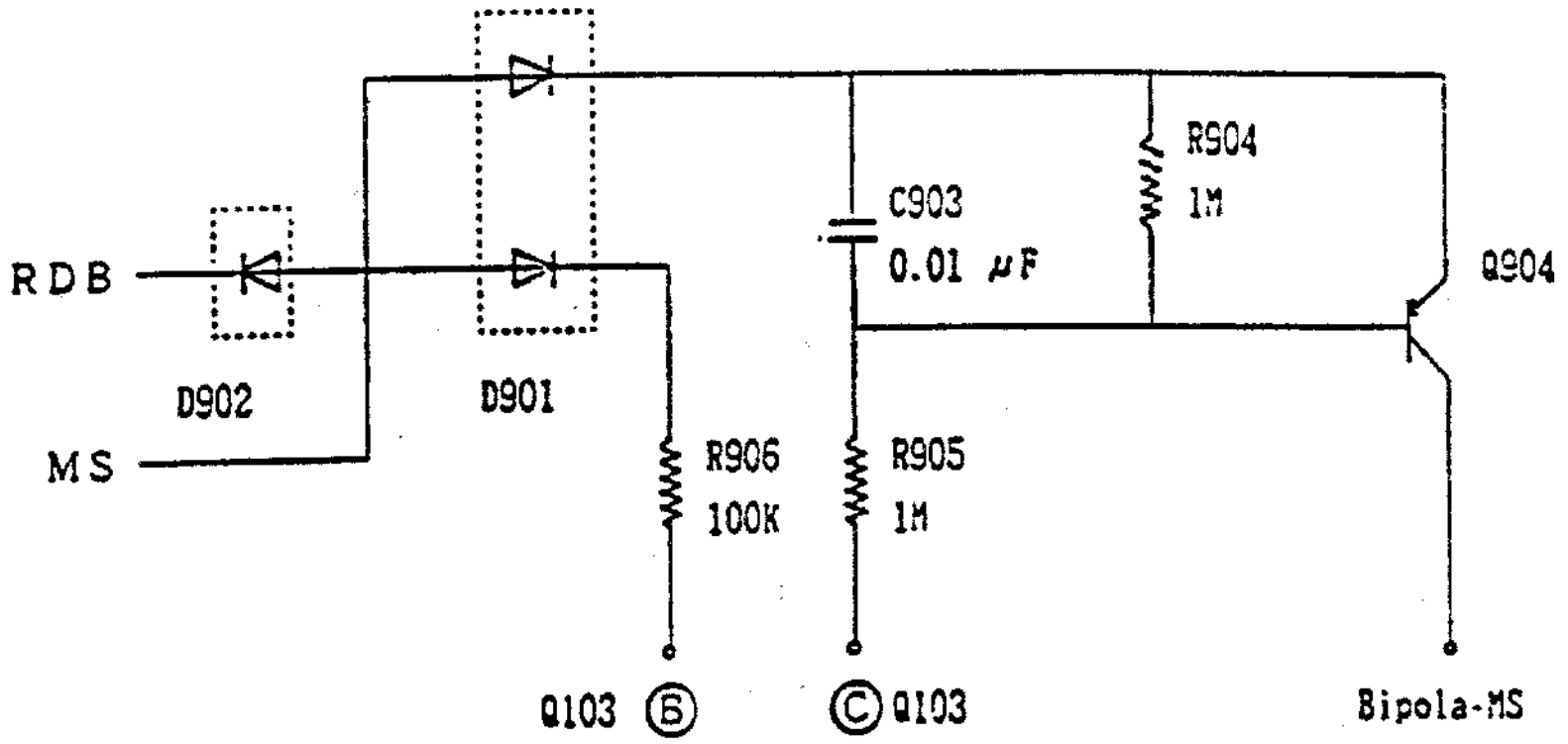
(3) When Q901 is made non-conductive, charging of C901 starts. Until the voltage reaches a certain level, Q902, Q903, LAMP, MEMO and other LEDs are turned OFF.

(4) About 30 ms after C901 is charged up, base voltage of Q902 is lowered to make it conductive. Q902, Q903, LAMP, MEMO and other LEDs are turned ON.

(5) When the reset switch is turned ON for changing mode, Q901 is made conductive, whereas Q902, Q903, LAMP, MEMO and other LEDs are turned OFF.

(6) When the reset switch is turned OFF, Q901 is made non-conductive and charging of C901 starts. For 30 ms after the reset switch is turned OFF, the LAMP, MEMO and other LEDs are turned OFF. Then the LEDs are lit.

○ Strobe misjudgment preventive circuit



• Description of circuit

- The strobe is flashed only at a shutter time of 1/60 or shorter in the direct auto strobe mode. A time calculated based on BV value obtained by average light measurement is used for judging the shutter time.
- The CPU may perform A/D conversion of the BV value even after the main switch is turned ON.
- When A/D conversion of the BV value is performed, the head amplifier provides standard voltage of 1.8V. It is switched to 1V when the main switch is turned ON.
- In such a case the A/D conversion is performed taking 1V as standard, thereby flashing the strobe at a shutter speed higher than 1/60. This circuit prevents such erroneous flashing of the strobe.
- The bipolar IC main switch is turned ON upon lapse of 2 to 3 ms after the CPU main switch is turned ON, and turned OFF within 0.4 ms.
- mzmzmz

(1) When the main switch is turndd ON, charging of C903 is started and Q904 is made non-conductive. After charging for 2 to 3 ms, Q904 is made conductive and the bipolar IC main switch is turned ON.

(2) When the main switch is turned OFF, C904 discharges. Upon lapse of about 0.4 ms, Q904 is made non-conductive.

3-6. External Circuits for IC

1. Mode switch and key input

(1) MANUAL mode
When pin No. 19 is connected to pin No. 13 on the CPU, it is energized and runs to the MANUAL program.

(2) AUTO mode
When pin No. 19 is freed on the CPU, it runs to the AUTO mode program.

(3) SPOT key (SW107)
When pin No. 17 is connected to pin No. 16 on the CPU, it is energized and runs to the SPOT mode program.

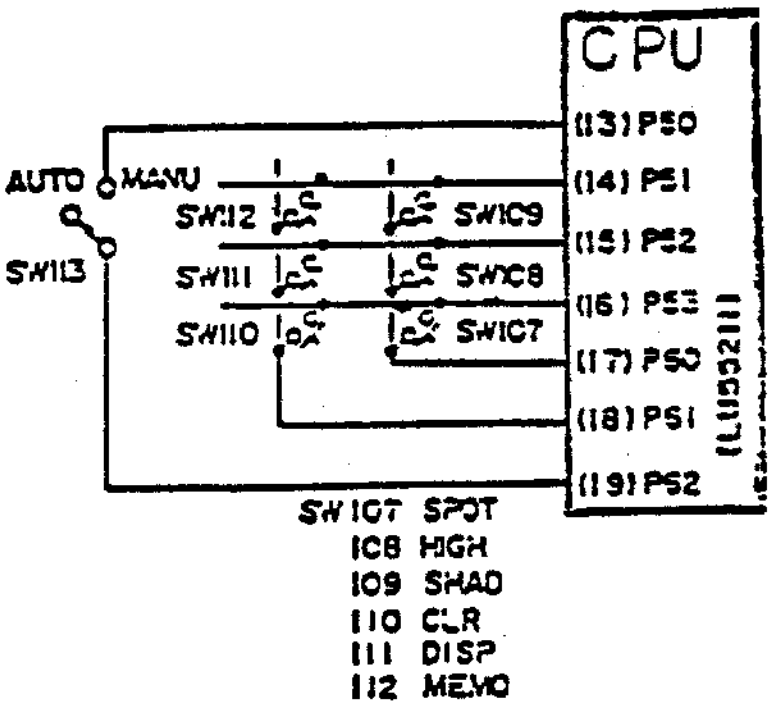
(4) HILIGHT key (SW108)
When pin No. 17 is connected to pin No. 15 on the CPU, it is energized and runs to the HILIGHT program.

(5) SHADOW key (SW109)
When pin No. 17 is connected to pin No. 14 on the CPU, it is energized and runs to the SHADOW program.

(6) CLEAR key (SW110)
When pin No. 18 is connected to pin No. 16 on the CPU, it is energized and runs to the CLEAR program.

(7) DISP key (SW111)
When pin No. 18 is connected to pin No. 15 on the CPU, it is energized and runs to the DISP program.

(8) MEMO key (SW112)
When pin No. 18 is connected to pin No. 14 on the CPU, it is energized and runs to the MEMO program.
The CPU flickers P102 by applying H and L signals to terminal No. 31.

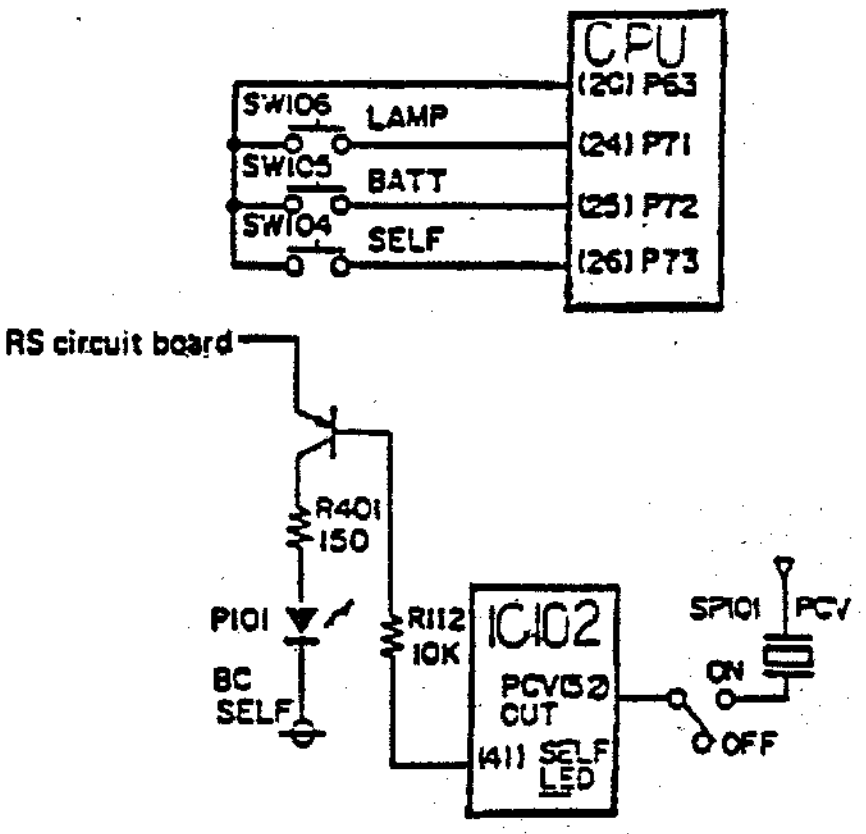


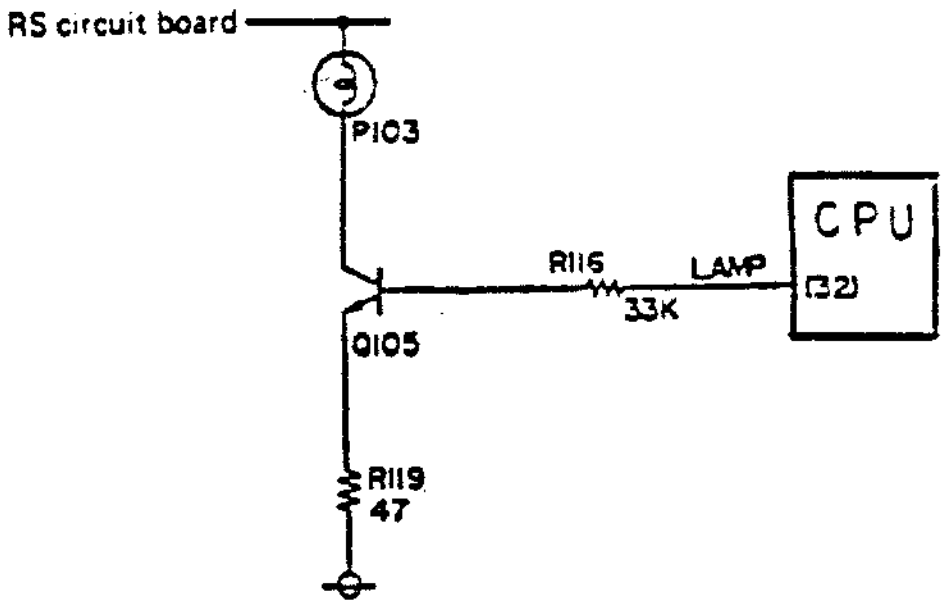
(9) SELF switch (SW104)
When pin No. 20 is connected to pin No. 26 on the CPU, it is energized and runs to the SELF program.
After the shutter is released, MG is kept deenergized. During this while, pulse signals are emitted from pins No. 41 and No. 52 of the bipolar IC to flicker LED P101 and sounds PCV SP101.
12 seconds later, pins No. 41 and No. 51 stop providing the output, pin No. 61 of the bipolar IC is set at L voltage, MG1 is driven and the shutter starts exposure.

(10) Battery switch (SW105)
When pin No. 20 is connected to pin No. 25 on the CPU, it is energized and runs to the battery check program.
The CPU transmits a battery check command to the bipolar IC. The CPU judges the answer and gives a command to the bipolar IC to determine whether or not pulse signal is to be transmitted from it.
The bipolar IC provides pulse signal or not to pins No. 41 and No. 52 according to the command.
LED P101 and PCV SP101 are actuated.

(11) Lamp switch (SW106)
When pin No. 20 is connected to pin No. 24 on the CPU, it is energized and runs to the LAMP program.
The CPU set pin No. 32 at H level and lights P103 for 10 seconds.

SW104 SW105 SW106





2. MG1 drive circuit

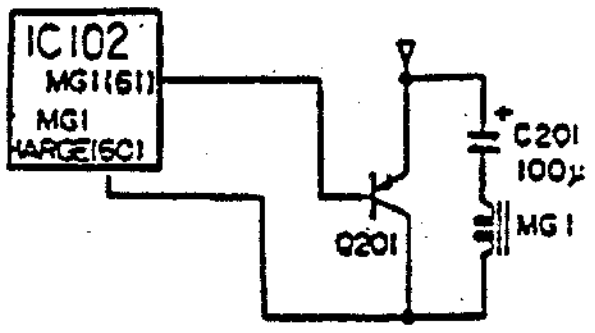
When power supply voltage exceeds the lock level or approx. 15 ms elapses after the main switch is turned ON, pin No. 61 is set at L level and Q201 is made conductive.

When Q201 is made conductive, C201 discharges and MG1 is energized. (The shutter is not locked.)

C201 is charged with a constant current of about 4 mA for 10 ms after completing photographing operation.

When power supply voltage is lower than the lock level, pin No. 61 is set at H level, MG1 is deenergized and the shutter is locked.

MG1 drive circuit

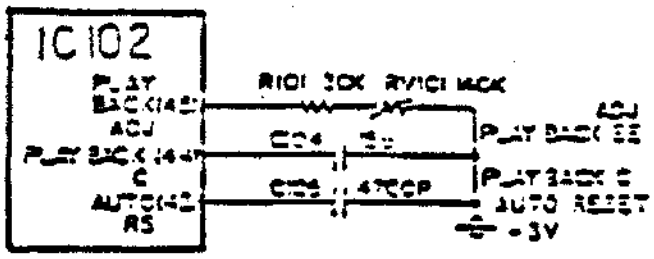


3. Regeneration EE adjusting regeneration C AUTO RESET circuits

- o Regeneration C (C104)
  This is an integrating capacitor for regeneration time (manual or spot).
- o Regeneration EE adjusting circuit
  For adjusting regeneration time
- o AUTO RESET (C105)

A capacitor for oereating CPU RESET signal. When power supply voltage becomes lower than the lock level, the bipolar IC stops operating, but starts operating again when battery voltage restores to about 2.9V. It is therefore necessary to start the program again from the clear start. This circuit outputs reset signal to the CPU for initializing.

Regeneration EE adjusting, regeneration C and AUTO RESET circuit



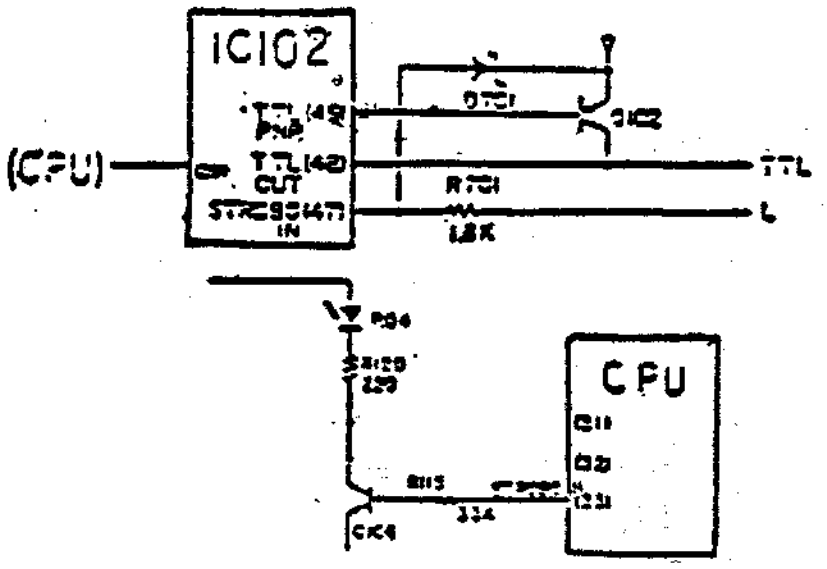
4. Strobe circuit

- o STROBIN (L terminal), flash control

(1) When the strobe is energized, the camera is switched to the strobe mode through the L terminal.

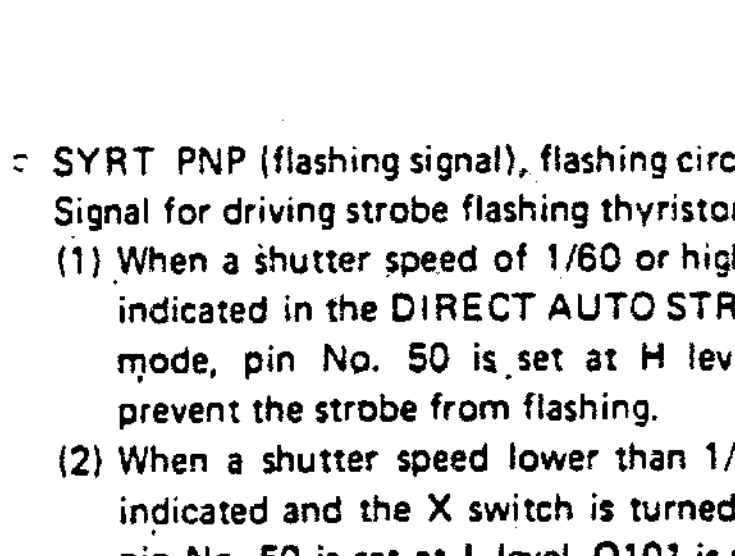
(2) When the strobe is charged up, pin No. 39 is set at L level. The CPU detects the L level, judges completing of the charging, sets pin No. 33 at H level and lights LED P104. (Lighting upon completing of charging.)

STROBIN (L terminal) flash control



- SYRT PNP (flashing signal), flashing circuit
  Signal for driving strobe flashing thyristor
  (1) When a shutter speed of 1/60 or higher is indicated in the DIRECT AUTO STROBE mode, pin No. 50 is set at H level to prevent the strobe from flashing.
  (2) When a shutter speed lower than 1/60 is indicated and the X switch is turned ON, pin No. 50 is set at L level, Q101 is made conductive, C103 discharges through C102 (R109), (camera body), Q101 and R110 and the thyristor is made conductive to flash the strobe.
  (3) When the strobe flashes, current from the L terminal stops and pin No. 40 of the bipolar IC is set at L level. The CPU detect the L level and knows the flashing of the strobe.
  (4) When the main switch is turned OFF after completing exposure, pin No. 50 of the bipolar IC is set at H level, Q101 is made non-conductive and C103 is charged through (body), R109, C103, R111 and R111.

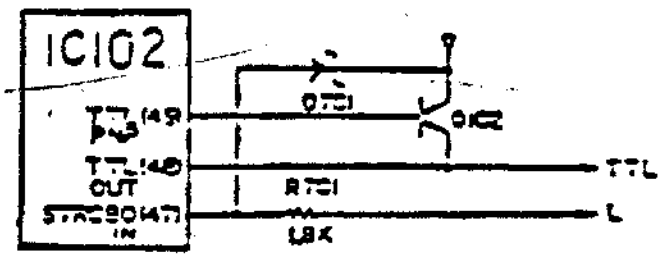
Flashing circuit



- TTL out (TTL output)
  When a shutter speed of 1/60 or lower is indicated immediately before shutter release and integral output does not exceed the judgment level in the DIRECT AUTO STROBE mode, pin No. 48 is set at H level and does not prevent the strobe from flashing.
  When the output exceeds the judgment level, pin No. 48 is set at L level to prevent the strobe from flashing.

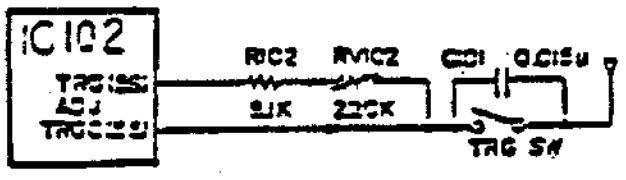
- TTL out PNP
  A PNP transistor for creating TTL signal. When pin No. 48 is set at H level, pin No. 49 is set at L level and Q102 is made conductive to apply voltage of H level to the strobe.

TTLout (TTL output)
TTLout PNP



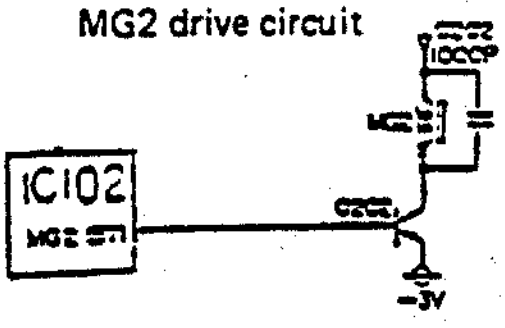
5. Trigger adjusting circuit
   The trigger switch is turned on at the initial stage. When the shutter is released, the trigger switch is turned OFF and integration start signal is fed to pin No. 55 of the bipolar IC. However, C101 serves to apply the voltage to pin No. 55 to prevent integrating operation from starting even after the trigger switch is turned OFF. Upon completing charging of C101, pin No. 55 is deenergized to start the integrating operation.
   Trigger timing can be created by varying charging time of C101.
   RV102 is arranged as the trigger timing adjusting resistor

Trigger adjusting circuit



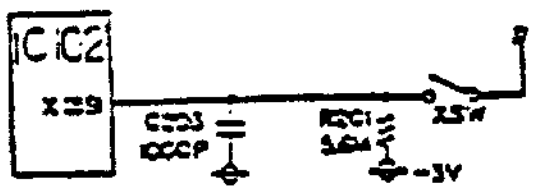
6. MG2 drive circuit
   When the comparator circuit of the bipolar IC is inverted at the correct exposure level, pin No. 57 is set at H level, Q202 is made conductive and MG2 is energized to elese the 2nd shutter blind.

MG2 drive circuit



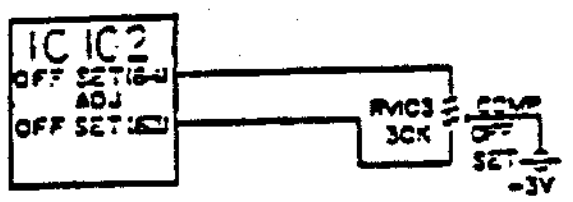
7. Synchronous switch (X SW)
When the synchronous switch (X) is turned ON, pin No. 59 is set at H level to make the flashing thyristor conductive and flash the strobe.

Synchronous switch



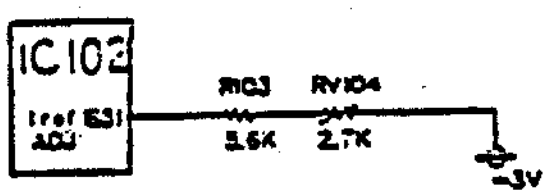
8. Offset adjusting circuit
This circuit is arranged for offset adjusting for the comparator of the bipolar IC.

Offset adjusting circuit



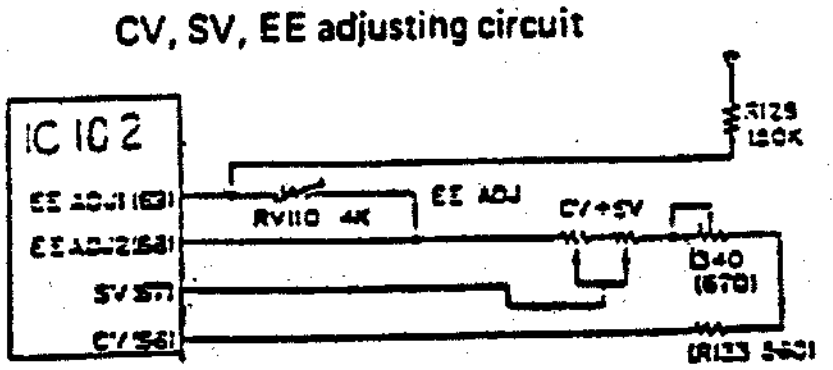
9. Standard current adjusting circuit
Since the BV output varies with temperature, it is necessary to adjust the standard current accordingly. This circuit is adopted for this adjustment.

Standard current adjusting circuit



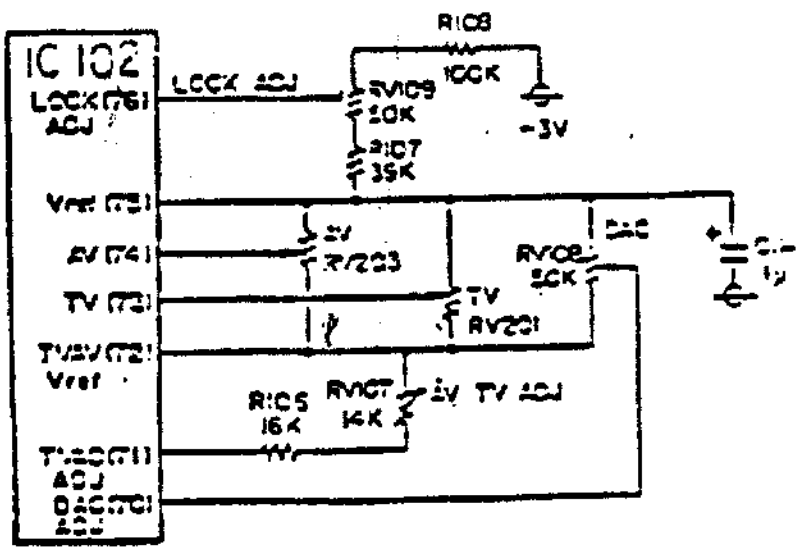
10. CV, SV, EE adjusting circuit
CV: Standard voltage for VC
SV: Standard voltage for CV and CV output
EE adjustment:
(1) For adjusting CV + SV output and direct EE
(2) For adjusting direct EE output (pin No. 69)

CV, SV, EE adjusting circuit



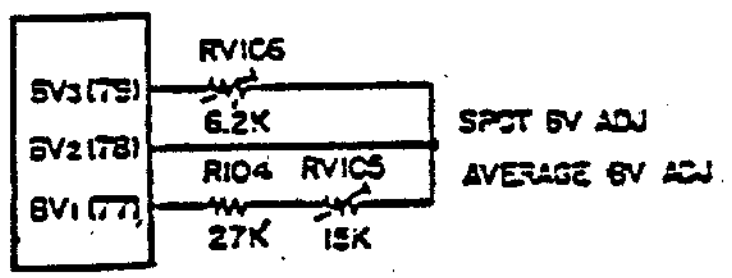
11. DAC, AV, TV, Lock adjusting circuit
DAC adjustment:
Circuit for adjusting D/A converter
TV/AV adjustment:
Circuit for generating standard voltage for TV/AV.
TV/AV Vref circuit:
Circuit for generating standard voltage for TV/AV.
TV, AV:
TV output and AV output
Lock adjusting circuit:
Circuit for adjusting lock voltage level.

DAC, AV, TV, Lock adjusting circuit

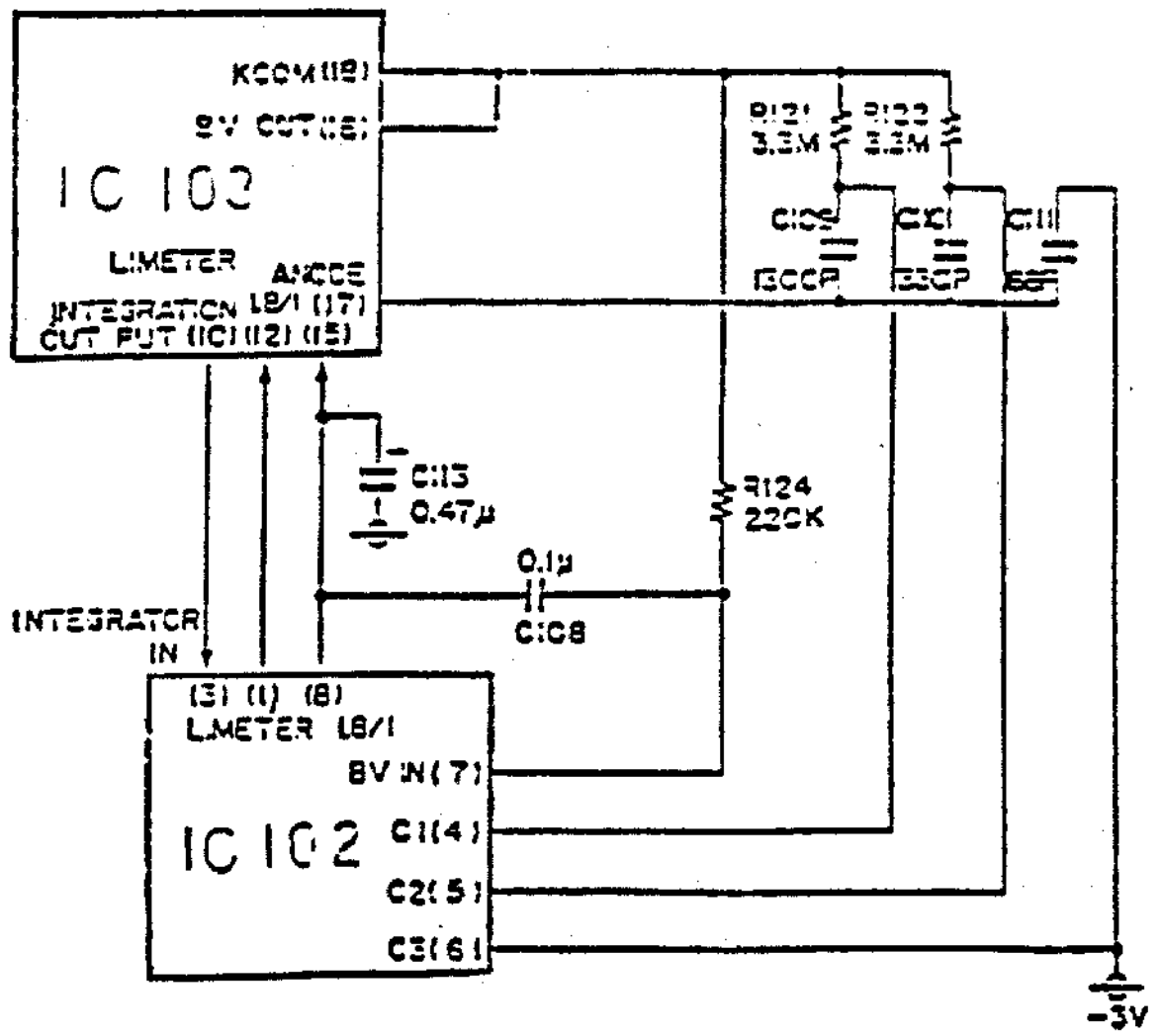


12. Spot BV adjusting & average BV adjusting circuit
BV_1: Resistor for adjusting indication BV
BV_2: Average BV output (from BV_3)
BV_3: Spot BV output

Average BC adjusting, Spot BV adjusting circuit



13. Direct integrating capacitor circuit
Integrating capacitor for the direct light measurement mode
- At high ASA levels from 320 to 3200
  C111 (69 pF) is selected.
- At medium ASA levels from 40 to 250
  C110 + C111 (398 pF) are selected.
- At low ASA levels from 6 to 30
  C109 + C110 (1630 pF) are selected.



V. DESCRIPTION OF PHOTOGRAPHING OPERATION

Operations for photographing in the MANUAL, AUTO, SPOT and other modes will be described below with reference to the CPU, bipolar IC, head amplifier, etc.

1. Difference between Indication Light Measurement and Exposure Light Measurement

1-1. Light Measurement for Indication

(1) Average light measurement
- Photosensors A and SPD are used selectively.
- Exposure time is indicated based on direct light measurement.
- The time is not used for actual exposure.
- The light measurement indication corresponds to that on the CdS meter in Model OM-2N.
- The indication is provided for manual exposure.

(2) Spot light measurement
- Photosensor elements S and SPD are used selectively.
- Brightness is measured in the SPOT mode.
- Film is actually exposed for the indicated time.
- Indication is provided for exposure in the manual spot mode.

1-2. Light Measurement for Actual exposure

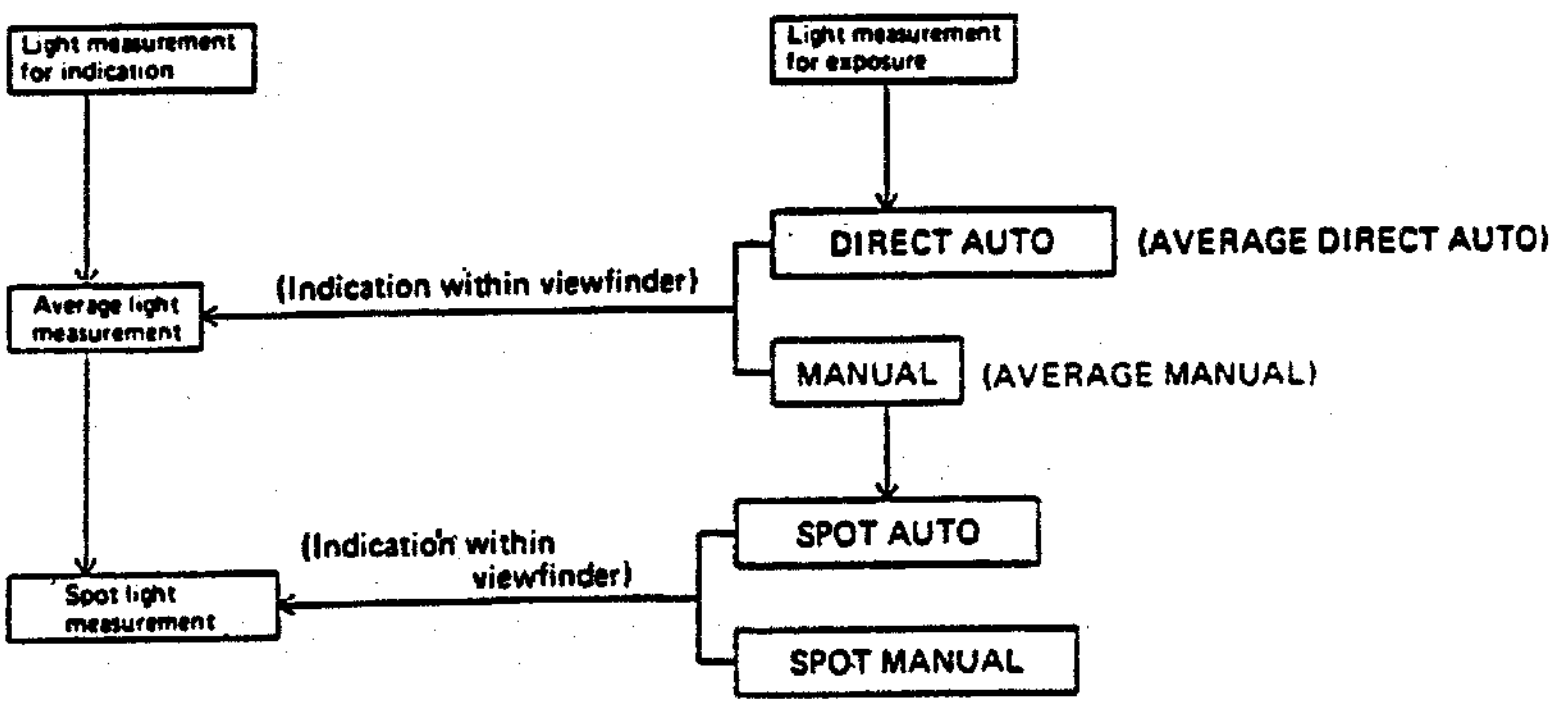
(1) Direct light measurement (called AVERAGE DIRECT AUTO mode)
- Photosensors A and SPD are used selectively.
- Brightness is measured in the AVERAGE DIRECT mode.
- Film is exposed actually in the indicated time.

(2) SPOT AUTO light measurement (SPOT AUTO)
- Measured brightness is stored into memory.
- Film is exposed actually in the indicated time.

(3) MANUAL (AVERAGE MANUAL)
- Manual exposure time is indicated for average determined by light measurement for indication.

(4) SPOT MANUAL
- Spot exposure time in the MANUAL mode is determined by spot light measurement for indication.

1-3. Relationship between Light Measurement for Indication and Light Measurement for Exposure

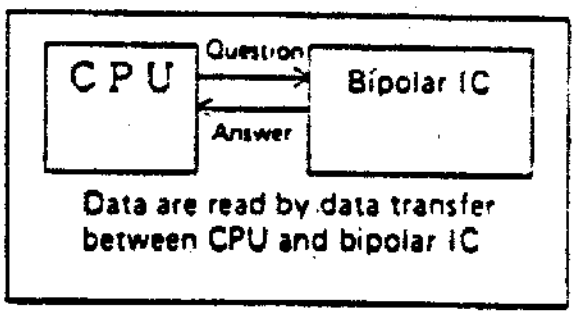


2. Sequence of Photographing Operations

1 Mode selection
- (AVERAGE DIRECT AUTO)
- (AVERAGE MANUAL)
- (SPOT AUTO)
- (SPOT MANUAL)

2 Data entry into CPU

1. Indicator ON upon selecting a mode
2. AV, TV, CV, SV and BV are read
   - AV – Aperture value
   - TV – Shutter time
   - SV – ASA value
   - CV – Corrected exposure time
   - BV – Brightness of object



Data are read by data transfer between CPU and bipolar IC

3 CPU calculates AV, TV, SV, CV and BV for indication with viewfinder

1. CPU calculates AV, TV, SV, CV and BV for indications within viewfinder.

4 Shutter released
- Shutter button depressed

5 MS ON
- Mirror UP and main SW ON

6 Interrupt to CPU
- Interrupt is made from indication within viewfinder to exposure mode.

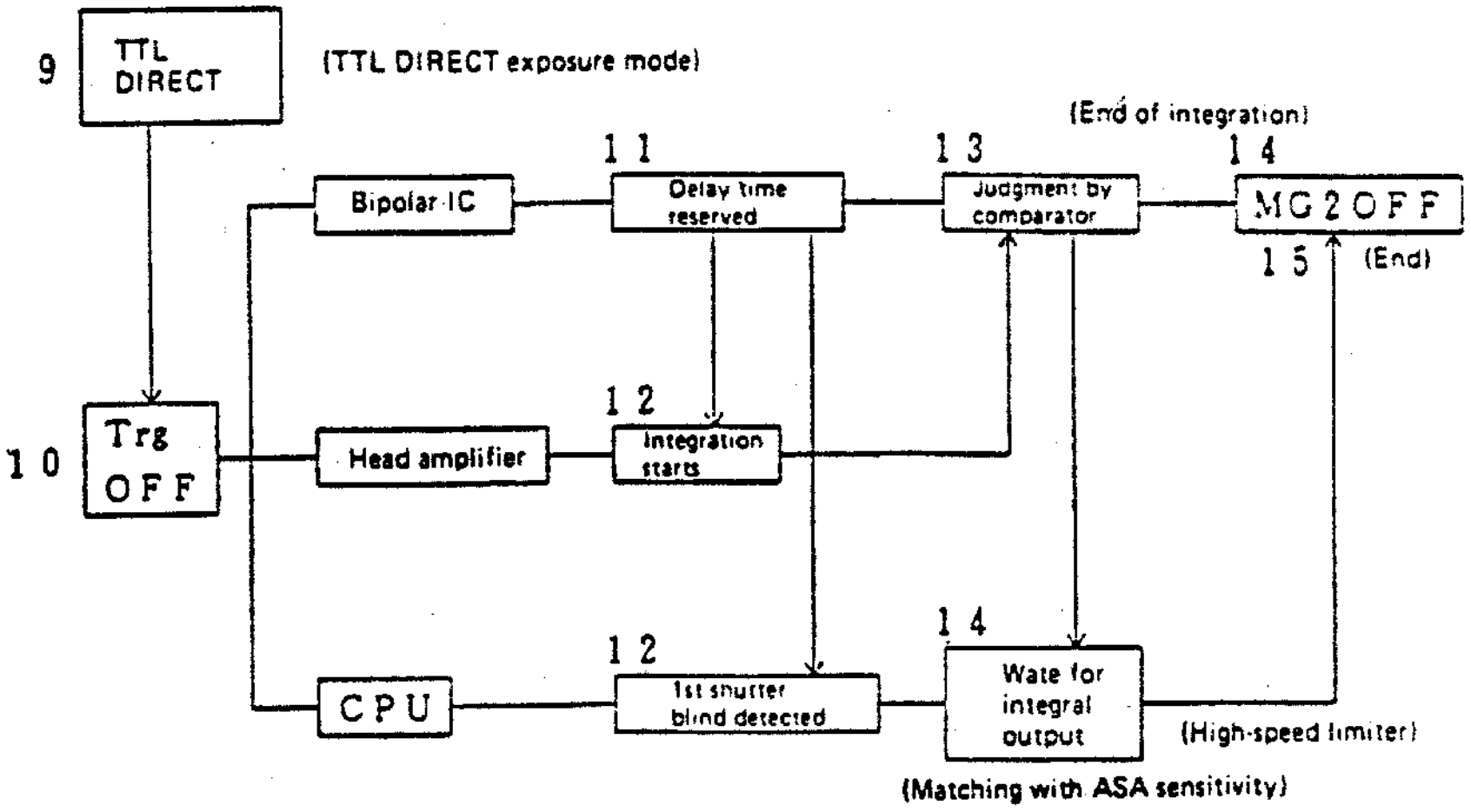
7 Exposure condition
- Proceeds to photographing mode

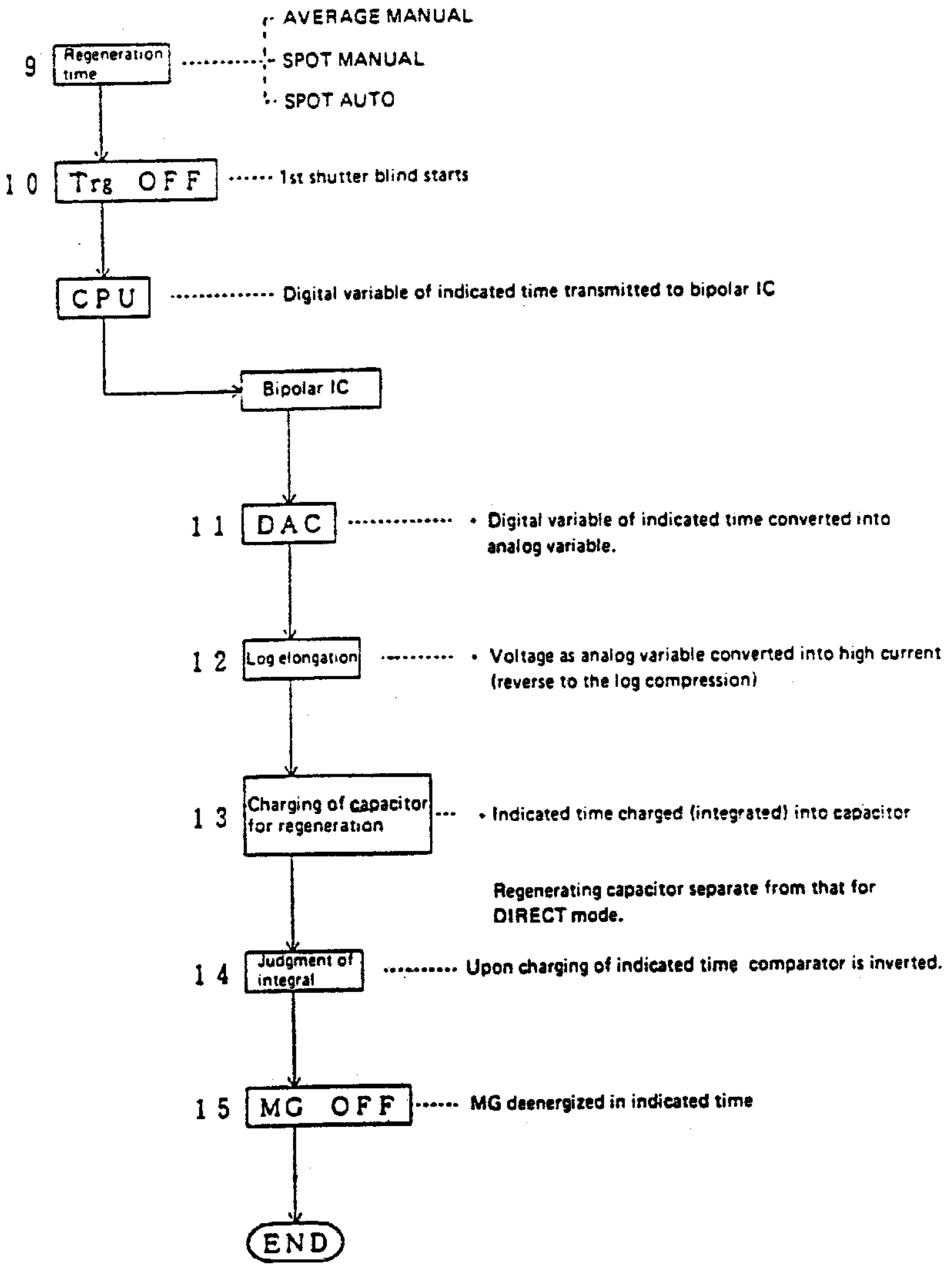
8 Exposure program runs
- Proceeds to selected mode programs respectively.

9 TTL DIRECT
- (DIRECT AUTO)

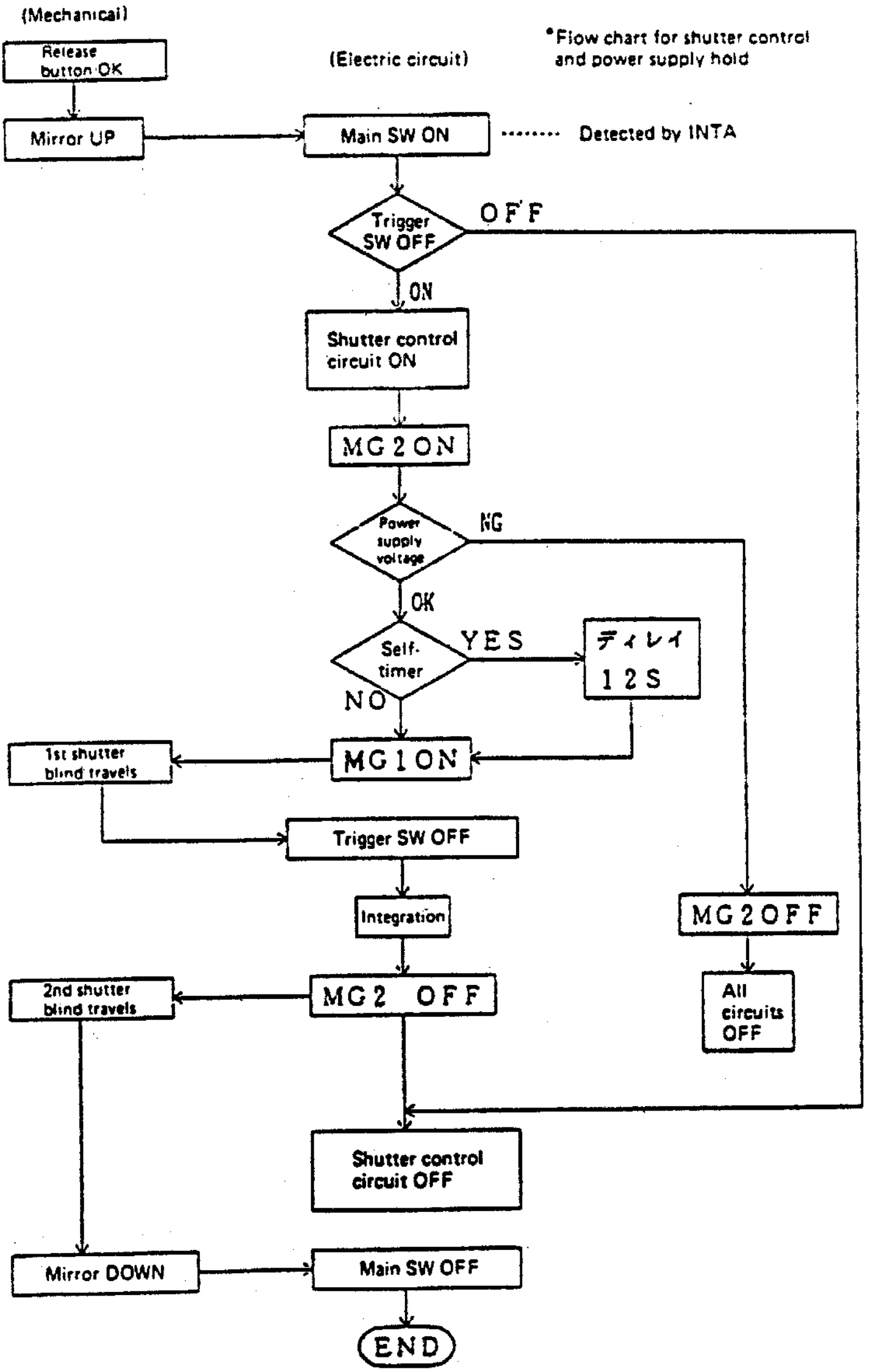
9 Regeneration time
- (AVERAGE MANUAL)
- (SPOT MANUAL)
- (SPOT AUTO)

*Regeneration time means an exposure time which is subjected to A/D conversion and again to D/A conversion.

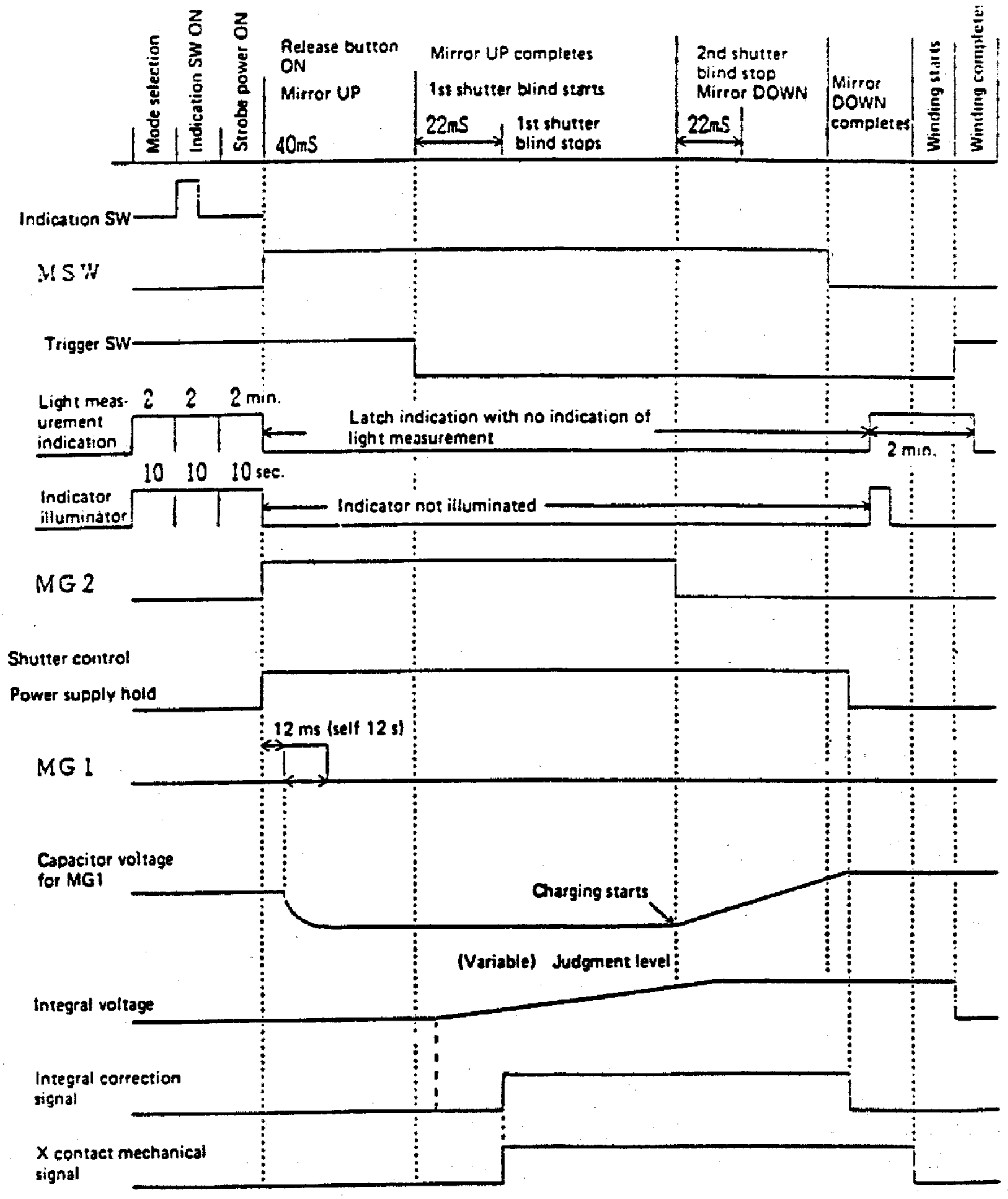

9
TTL DIRECT
(TTL DIRECT exposure mode)
(End of integration)
11
13
14
Bipolar IC
Delay time reserved
Judgment by comparator
MG2OFF
15
(End)
12
10
Trg OFF
Head amplifier
Integration starts
14
12
CPU
1st shutter blind detected
Wate for integral output
(High-speed limiter)
(Matching with ASA sensitivity)


AVERAGE MANUAL
9 Regeneration time
SPOT MANUAL
SPOT AUTO
10 Trg OFF
1st shutter blind starts
CPU
Digital variable of indicated time transmitted to bipolar IC
Bipolar IC
11 DAC
• Digital variable of indicated time converted into analog variable.
12 Log elongation
• Voltage as analog variable converted into high current (reverse to the log compression)
13 Charging of capacitor for regeneration
• Indicated time charged (integrated) into capacitor
Regenerating capacitor separate from that for DIRECT mode.
14 Judgment of integral
Upon charging of indicated time comparator is inverted.
15 MG OFF
MG deenergized in indicated time
END

3. Exposure Program Flow Chart



4. Indication & Exposure Time Chart



Z. OTHERS

CONTENTS

I. INFORMATION OF SHUTTER

1. Shutter locked by selecting MANUAL mode while shutter is opened in AUTO mode. Z-1

II. INFORMATION ON USE OF STROBE

1. OVER indication within viewfinder with strobe flickering Z-1
2. OVER often indication within viewfinder in use of T-series strobe Z-1
3. How many strobes can be attached simultaneously? Z-1
4. Strobe usable at mechanical shutter time (1/60) without battery Z-1
5. Strobe flashing synchronized at manual time of 1/125 ~ 1/2000? Z-1

III. INFORMATION ON SPOT LIGHT MEASUREMENT AND EXPOSURE

1. How is exposure affected by changing F No., ASA and ± correction after spot light measurement? Z-2
2. How is exposure affected by using preset for spot light measurement? Z-2
3. Shutter is not opened for 4 min. in spot light measurement Z-2

IV. OTHERS

1. All OM system compatible? Z-2
2. How is diopter lens 5 usable? Z-2

I. INFORMATION OF SHUTTER

Question	Answer
1. Shutter is closed by selecting MANUAL mode while shutter is opened in AUTO mode, and shutter is locked upon depressing shutter button in MANUAL mode.	Mode change is inhibited during photographing operation. When it is desired to close shutter while it is opened in AUTO mode, select the B. check mode before closing the shutter. This phenomenon occurs in the products manufactured at the initial stage (August to October) but is no sign of a trouble. In case of the products manufactured after October, shutter is not closed and AUTO operation continues even when MANUAL mode is selected while shutter is opened in the AUTO mode.

II. INFORMATION ON USE OF STROBE

1. Lamp flickers in operation with T-series strobe but OVER indicated within viewfinder	Indication within the viewfinder reliable. Change F No. or photographing distance. When T-series strobe is deenergized during flashing, it flickers the lamp as indication of strobe light control. At short photographing distance, however, correct exposure may not be obtained by stopping flashing. In such a case, OVER is indicated within the viewfinder. It is suggested to answer that the conflicting indications are due to the high performance of the camera.
2. Exposure is apparently controlled to the correct level in TTL AUTO mode but OVER is indicated within viewfinder in operation with T-series strobe (filmy surface paper loaded)	Filmy surface paper having reflectance higher than that of film is apt to cause OVER to be indicated. Use paper having reflectance similar to that of film should be used for demonstration.
3. How many strobe can be attached simultaneously?	Nine strobes can be attached simultaneously by using the direct contact, TTL auto synchro socket and TTL auto multi-connector.
4. Strobe usable at mechanical shutter time without battery?	Unusable. Since the strobe is flashed with the thyristor, it cannot be used without battery.
5. Strobe flashing synchronized at manual time of 1/125 ~ 1/2000?	The strobe flashes at all the manual times. However, note that it is not synchronized as 1/125 ~ 1/2000. In the AUTO mode, the strobe flashes at the brightness corresponding to 1/60 sec. or longer. It does not flash at the brightness corresponding to longer exposure times.

III. INFORMATION OF SPOT LIGHT MEASUREMENT AND EXPOSURE

Question	Answer
1. How is exposure affected by changing F No., ASA and ± correction after spot light measurement?	When F No., ASA and/or ± correction is modified, shutter speed is varied correspondingly to EV value in the spot light measurement. When F No. is changed, shutter speed is varied in correspondence to EV value and becomes equal to the exposure time in the SPOT mode. When ± correction is modified, exposure time is set at a level corresponding to EV value in the SPOT mode. (Shutter speed is varied.)
2. How is exposure affected by using present in spot light measurement?	Misoperation to result in over-exposure. Since exposure degree is determined based on the light intensity reduced by the preset, over-exposure results in to a degree corresponding to the number of steps from open to stop-down position. NOTE: Exposure degree is unaffected in light measurement other than the SPOT mode (direct light measurement).
3. Shutter is not opened for 4 min. in spot light measurement.	Use 50 mm F1.4 lens. The shutter is opened for about 4 minutes by releasing it in the dark at ASA 100, F1.4 and spot F16. The camera is controlled by the microcomputer so that exposure time determined at F1.4 in the SPOT mode is set at 0 EV at F16. Since light measurement in the SPOT mode at F16 cannot determine brightness accurately in the dark, the shutter is not opened for 4 minutes.

IV. OTHERS

1. All OM systems compatible?	Recodata Back 1 and 2 are incompatible with Model OM-4. 250 film back is compatible if partially modified. POL filter is unusable in the multi-spot mode.
2. How is diopter lens 5 usable?	Model OM-4 is designed for dioptric control within a range of +1 to −3.0. When a lens deviating from this range is combined with Model OM-4, diopter should be adjusted by using an eye cup.